

APPLICATION FOR UNITED STATES LETTERS PATENT

TITLE: AUTOMATED BANKING  
MACHINE AND SYSTEM  
INVENTORS: DRUMMOND, ET AL.  
DOCKET: D1077+6

TECHNICAL FIELD

5

This invention relates to automated banking machines. Specifically this invention relates to an automated banking machine apparatus and system that is capable of use in a wide area network, which provides a user with a familiar interface from their home institution at banking machines operated by other institutions, and which provides greater options for machine outputs.

BACKGROUND ART

10  
15  
20  
25  
30  
35  
40  
45  
50  
55  
60  
65  
70  
75  
80  
85  
90  
95

Automated banking machines are well known. A common type of automated banking machine used by consumers is an automated teller machine ("ATM"). ATMs enable customers to carry out banking transactions. Common banking transactions that may be carried out with ATMs include the dispensing of cash, the making of deposits, the transfer of funds between accounts, the payment of bills and account balance inquiries. The type of banking transactions a customer can carry out are determined by capabilities of the particular banking machine and the programming of the institution operating the machine. Other types of automated banking machines may allow customers to charge against accounts or to transfer funds. Other types of automated banking machines may print or dispense items of value such as coupons, tickets, wagering slips, vouchers, checks, food stamps, money orders, scrip or travelers checks. For purposes of this disclosure an automated banking machine or automated transaction machine shall encompass any device which carries out transactions including transfers of value.

Currently ATMs are operated in proprietary communications networks. These networks interconnect ATMs operated by financial institutions and other entities. The interconnection of the networks often enables a user to use a banking machine operated by another institution if the foreign institution's banking machine is interconnected with the network that includes the user's institution. However when the customer operates the foreign institution's machine the customer must operate the machine using the customer interface that has been established by the foreign institution for its banking machines. In addition the user is limited to the transaction options provided by the foreign institution.

A customer may encounter difficulties when using a foreign institution's machine. Problems may occur because the user is not familiar with the type of machine operated by the foreign institution. Confusion may result because the customer does not know which buttons or other mechanisms to actuate to accomplish the desired transactions. The transaction flow for a customer at a foreign institution machine may be significantly different from machines operated by the user's home institution. This may be particularly a problem when the user is from another country and is not familiar with the type of banking machine or the language of the interface provided by the foreign institution. Likewise, the documents which are printed by printers in an automated banking machine are generally limited to a limited group of defined formats in a single language.

A foreign institution may also provide different types of transactions than the user is familiar with at their home institution. For example the user's home institution may enable the transfer of funds between accounts through their automated banking machines, to enable the user to maintain funds in higher interest bearing accounts until they are needed. If the foreign

institution does not provide this capability, the user will be unable to do this when operating the foreign machine. The inability of a user at a foreign machine to conduct the transactions that they are accustomed to may present problems.

5 The networks that operate automated teller machines and other types of automated banking machines generally operate proprietary networks to which access is restricted. This is necessary to prevent fraud or tampering with the network or user's accounts. Proprietary networks are also generally used for the transmission of credit card messages and other financial transaction messages. Access to such credit card processing systems is also restricted primarily for purposes of maintaining security.

10 Communication over wide area networks enables messages to be communicated between distant locations. The best known wide area network is the Internet which can be used to provide communication between computers throughout the world. The Internet is not widely used for financial transaction messages because it is not a secure system. Messages intended for receipt at a particular computer address may be intercepted at other addresses without detection. Because the messages may be intercepted at locations that are distant in the world from the intended recipient, there is potential for fraud and corruption.

15 Companies are beginning to provide approaches for more secure transmission of messages on the Internet. Encryption techniques are also being applied to Internet messages. However the openness of the Internet has limited its usefulness for purposes of financial 20 messages, particularly financial messages associated with the operation of automated banking machines.

Messages in wide area networks may be communicated using the Transmission Control Protocol/Internet protocol ("TCP/IP"). U.S. Patent No. 5,706,422 shows an example of a system in which financial information stored in databases is accessed through a private wide area network using TCP/IP messages. The messages transmitted in such networks which use TCP/IP may include "documents" (also called "pages"). Such documents are produced in Hypertext Markup Language ("HTML") which is a reference to a type of programming language used to produce documents with commands or 'tags' therein. The tags are codes which define features and/or operations of the document such as fonts, layout, imbedded graphics and hypertext links. HTML documents are processed or read through use of a computer program referred to as a "browser". The tags tell the browser how to process and control what is seen on a screen and/or is heard on speakers connected to the computer running the browser when the document is processed. HTML documents may be transmitted over a network through the Hypertext Transfer Protocol ("HTTP"). The term "Hypertext" is a reference to the ability to embed links into the text of a document that allow communication to other documents which can be accessed in the network.

10  
15  
20  
25  
30

Thus there exists a need for an automated banking machine and system that can be used in a wide area network such as the Internet while providing a high level of security. There further exists a need for an automated banking machine and system which provides a user with the familiar interface and transaction options of their home institution when operating foreign institution machines. There further exists a need for a machine which may provide more transaction options and types of promotional and printed materials to users.

## DISCLOSURE OF INVENTION

It is an object of the present invention to provide an automated banking machine at which a user may conduct transactions.

5 It is a further object of the present invention to provide an automated banking machine that may be operated through connection to a wide area network.

It is a further object of the present invention to provide an automated banking machine and system that provides a user with a familiar interface and transaction options of their home institution at machines operated by foreign institutions.

It is a further object of the present invention to provide an automated banking machine that communicates using HTML documents and TCP/IP messages.

It is a further object of the present invention to provide an automated banking machine that enables the connection of the banking machine to a user's home institution through HTML documents and TCP/IP messages generated responsive to indicia on a card input by a user.

It is a further object of the present invention to provide an automated banking machine and system that accomplishes transactions over a wide area network while maintaining a high level of security.

It is a further object of the present invention to provide an automated banking machine and system that controls connection of the banking machine to foreign addresses through a proxy server.

20 It is a further object of the present invention to provide an automated banking machine that limits the operation of devices in the machine through a local device server.

It is a further object of the present invention to provide an automated banking machine and system that is operable through connection to the Internet.

It is a further object of the present invention to provide an automated banking machine that may be used to provide a user with more types of messages including messages targeted to 5 particular users.

It is a further object of the present invention to provide an automated banking machine which is capable of providing users with a wider variety of printed documents.

It is a further object of the present invention to provide an automated banking machine which provides additional options for identifying authorized users.

It is a further object of the present invention to provide an automated banking machine that can be used in connection with existing transaction systems while providing enhanced functionality.

It is a further object of the present invention to provide an automated banking machine which provides enhanced diagnostic and service capabilities.

It is a further object of the present invention to provide an automated banking machine which performs transactions at a rapid pace.

It is a further object of the present invention to provide improved systems in which automated banking machines are used.

It is a further object of the present invention to provide improved methods of operation 20 for automated banking machines and systems.

Further objects of the present invention will be made apparent in the following Best Modes for Carrying Out Invention and the appended Claims.

The foregoing objects are accomplished in a preferred embodiment of the invention by an automated banking machine that includes an output device such as a display screen, and an input device such as a touch screen or a keyboard. The banking machine further includes devices such as a dispenser mechanism for sheets of currency, a printer mechanism, a card reader/writer, a depository mechanism and other physical transaction function devices that are used by the machine to accomplish banking transactions.

The banking machine further includes a computer. The computer is in operative connection with the output devices and the input devices, as well as with the sheet dispenser mechanism, card reader and other physical transaction function devices in the banking machine. The computer includes software programs that are executable therein. The software programs include an HTML document handling portion. The HTML document handling portion operates to send and receive HTML documents and HTTP messages. The HTML document handling portion is preferably in connection with the output device to display screens including hypertext link indicators. The HTML document handling portion is also preferably in connection with the input device which enables user selection and the generation of response messages from the computer. The HTML document handling portion preferably operates in connection with a JAVA software environment and has the capability of executing instructions in JAVA script transmitted with HTML documents.

The software in the computer further preferably includes a device application portion. The device application portion includes software that is operative to control the sheet dispenser and other devices. In the preferred form of the invention the device application portion includes a plurality of JAVA applets for operating the devices in the machine.

The computer in the automated banking machine further includes a device interfacing software portion. The device interfacing software portion operates to receive messages from the device application portion and to cause the devices to operate through appropriate hardware interfaces. In one preferred form of the automated banking machine, the HTML document handling portion, device application portion and device interfacing software portion each reside on the same computer and communicate at different IP ports.

The automated banking machine of the invention in one configuration communicates using TCP/IP messages in an intranet which includes a plurality of such machines. The intranet is in turn connected to at least one computer which is operated by a home institution. The home institution is the entity that operates the banking machines.

The computer of the home institution preferably includes a home HTTP server, a proxy server and a device server. The proxy server communicates through the intranet with the HTML document handling portion of the software in each of the banking machines. The proxy server is also connectable to a wide area network, such as the Internet, to which foreign servers are connected. The device server is operative to pass messages between the device application portion and the device interfacing software portion of the banking machines. The device server may include monitor software which monitors and selectively limits the use and operation of the devices in the banking machine. This provides a level of security.

The automated banking machine and system is operative to place a user in connection with the institution where they have their accounts. This can be either the home institution that operates the banking machine where the user is present, or a foreign institution which is connected to the wide area network. To operate the banking machine a user provides inputs

which correspond to an address, such as a URL address, through an address input device. The HTML document handling portion operates to connect the banking machine to the server corresponding to that address. This is preferably accomplished by the user having indicia representative of the address on a card that is read by a card reader in the banking machine, or other input device which identifies the user or an institution or entity with which the user has accounts.

The HTML document handling portion is responsive to the address on the card or other input data to connect through the proxy server to the user's institution. If the user's home institution address corresponds to the home server, the banking machine operates responsive to messages from the home server. If however the user's input address corresponds to an address of a foreign server, the proxy server is operative to communicate through the wide area network with the foreign server at the customer's home institution. If the customer causes the machine to connect a server operated by a foreign institution, the HTML documents sent from the foreign institution correspond to those normally provided by the foreign institution. As a result the customer is familiar with the interface produced by these documents and will be able to more readily operate the banking machine.

10  
11  
12  
13  
14  
15  
16  
17  
18  
19

The foreign server or home server operate the banking machine by sending HTML documents that include instructions for operating the devices in the banking machine. The instructions are transmitted from the HTML document handling portion to the device application portion of the software, which operates the devices in response to the instructions. The instructions from the device application portion to the devices in the automated banking machine are passed through the device server of the home institution. This helps to maintain security. In

addition, the proxy server includes screening software which limits the foreign servers which may connect to and operate the banking machine. This is referred to as a "fire wall."

Embodiments of the present invention also provide enhanced user interfaces and for the printing of a wide variety of documents with the banking machine. The invention also enables 5 achieving enhanced functionality while utilizing existing transaction networks and automated transaction machines.

#### BRIEF DESCRIPTION OF DRAWINGS

Figure 1 is a schematic view of a network configuration including the automated banking machine apparatus and system of the present invention.

Figure 2 is a schematic view of a preferred embodiment of an automated banking machine of the present invention.

Figures 3 through 24 show schematic views of the automated banking machine, an intranet connecting the banking machine to a computer system of a home bank and a wide area network connecting the computer system of the home bank to a foreign bank.

15 Figures 3 through 18 schematically represent steps in a transaction carried out at the banking machine with the computer system of the home bank.

Figures 19 through 24 schematically represent steps in a transaction carried out at the banking machine with the computer system of the foreign bank.

20 Figure 25 is a schematic view of a network configuration including an alternative embodiment of the automated banking machine of the present invention.

Figure 26 is a schematic view of frames in the HTML document handling portion of the alternative embodiment of the automated banking machine shown in Figure 25.

Figure 27 is a schematic view of a customer interface of an automated banking machine and the function keys and keypad keys included in the interface.

5 Figures 28-30 schematically represent exemplary steps in converting function key and keypad key inputs to keyboard stream and mouse stream inputs.

Figure 31 schematically represents exemplary steps in printing documents with the automated banking machine.

#### BEST MODES FOR CARRYING OUT INVENTION

Referring now to the drawings and particularly to Figure 1, there is shown therein a network configuration schematically indicated 10, which includes the automated banking machine apparatus and system of one preferred embodiment of the present invention. Network 10 includes a plurality of automated banking machines 12 which in the preferred embodiment of the invention are ATMs. ATMs 12 are connected to a computer system of a home bank 15 schematically indicated 14. Home bank computer system 14 is the computer system that is operated by the bank or other institution which has primary responsibility for the ATMs 12. Home bank computer system 14 is connected to the ATMs 12 through an intranet 16. Intranet 16 is preferably a local or proprietary network that provides communication between the computer system 14 and the banking machines 12 using messages in the transmission control 20 protocol/internet protocol ("TCP/IP") format.

5

The messages that are communicated through the intranet 16 are preferably TCP/IP messages and hypertext mark up language ("HTML") documents. In one preferred embodiment of the invention the HTML documents sent through intranet 16 include embedded object oriented programming instructions, preferably in the JAVA® format which has been developed by Sun Microsystems. The messages sent through intranet 16 may be sent in an encrypted or unencrypted form depending on the nature of the system and the security needs of the home bank.

It should be understood that embodiments of the invention may process other forms of documents which include tags or instructions therein. For example a form of "extended" HTML has recently been proposed which may be used in embodiments of the invention. For purposes of the invention all such forms of languages and variants which include documents, which documents include instructions therein shall be referred to as HTML documents. Likewise, while JAVA® is used in the described embodiment, other programming languages may be used. For example, Active-X™ developed by Microsoft Corporation or other languages may be used in other embodiments. Further it should be understood that the instructions included in documents may be operative to cause a computer to access other documents, records or files at other addresses to obtain a program to carry out an operation.

Request  
15  
20

20

Home bank computer system 14 is also connectable as shown to a wide area network 18. In some embodiments of the invention the wide area network 18 is the Internet. In other embodiments of the invention, other wide area networks may be used. The wide area network preferably communicates messages in TCP/IP between numerous computer systems connected to the wide area network. These foreign computer systems are schematically represented by servers

20, 22, 24, 26 and 28. It should be understood that servers 20 through 28 may be operated by or connected to other financial institutions throughout the world. Servers 20 through 28 preferably operate by communicating HTML documents and other HTTP messages.

Figure 2 shows a schematic view of the ATM 12 used in connection with one preferred embodiment of the invention. ATM 12 includes a touch screen 30. Touch screen 30 includes a display screen which serves as an output device for communication with a user of the machine. Touch screen 30, because it is a touch screen, also serves as an input device for receiving input instructions from a user. Touch screen 30 is connected through an interface 32 to a computer 34 which is preferably housed within the machine. Alternative embodiments of the invention may include other output devices such as audio speakers.

10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20

20

Computer 34 is also in connection with a plurality of transaction function devices 36 which are included in ATM 12. Devices 36 include for example, a card reader/writer mechanism 38 and a keyboard 40. Devices 36 further include a sheet dispenser mechanism 42 which is operative to dispense sheets, which in some preferred forms of the invention are currency or bank notes. Devices 36 also include a depository 44 for accepting deposits into a secure location in the machine. A receipt printer 46 for providing transaction receipts to customers is also included among devices 36. A journal printer 48 is also included among the devices for keeping a hard copy record of transaction information. In other embodiments other or additional transaction function devices which carry out other transaction functions may be used. Other embodiments may include fewer transaction function devices. It should be further understood that while the described embodiment of the invention is an automated banking machine, the principles of the

invention may be employed in many types of transaction machines that do not necessarily carry out banking transactions.

Each of the devices is operatively connected to an internal control bus 50 within the banking machine 12. The control bus 50 outputs the internal messages to the particular devices.

5 Each device has an appropriate hardware interface which enables the particular device to operate to carry out its respective function in response to the messages transmitted to it on control bus 50.

Card reader/writer 38 has a hardware interface schematically shown as 52. Hardware interfaces 54, 56, 58, 60 and 62 are respectively operative to connect keyboard 40, sheet dispenser mechanism 42, depository mechanism 44, receipt printer mechanism 46 and journal printer mechanism 48 to the control bus 50.

10 Computer 34 has several software programs that are executable therein. In the preferred embodiment of the invention these software programs include a device interfacing software portion generally indicated 64. Device interfacing software portion 64 preferably includes a software device interface 66 that communicates electronic messages with the control bus 50. The device interface software portion 64 also preferably includes a device manager 68. The device manager is preferably operative to manage the various devices 36 and to control their various states so as to be assured that they properly operate in sequence. The device manager is also preferably operable to create device objects in the software so as to enable operation of the devices by at least one object oriented program 70. Device interfacing software portion 64 also 15 includes the object oriented program portion 70, which in one preferred embodiment is an application written in the JAVA language. Program 70 works in conjunction with the device manager to receive object oriented JAVA messages which cause the devices to operate, and to 20

transmit device operation messages indicative of a manner in which devices are operating and/or are receiving input data.

The device interfacing software portion 64 in the described embodiment operates on computer 34 and communicates through a physical TCP/IP connection 72 with the intranet 16.

5 The physical connection may be analog dial-up, serial port, ISDN connection or other suitable connection. In the configuration of the system as shown, device interfacing software portion 64 communicates at the IP address of computer 34 and at an IP port or socket indicated 74 that is different from the other software applications. In other embodiments of the invention, device interfacing software portion 64 may operate in a different computer than the other software applications of the invention.

It should further be understood that although in the preferred embodiment of the invention the device interfacing portion 64 is software, in other embodiments of the invention all or portions of the instruction steps executed by software portion 64 may be resident in firmware or in other program media in connection with one or more computers, which are operative to communicate with devices 36. For purposes of the invention all such forms of executable instructions shall be referred to as software.

Other software also operates in computer 34. This software includes HTML document handling software which includes a browser, schematically indicated 76. In the preferred embodiment of the invention the HTML document handling software includes a browser provided by Netscape®. However in other embodiments other HTML document handling and communicating software and browser software, such as Hot JAVA® by Sun Microsystems or

Internet Explorer™ from Microsoft, may be used. Browser 76 communicates in computer 34 at an IP port indicated by 78.

5 Browser 76 is in operative connection with JAVA environment software 80 which enables computer 34 to run JAVA language programs. JAVA language programs have the advantage that they operate the same on a variety of hardware platforms without modification. This "write once\run anywhere" capability makes the JAVA environment well-suited for the described embodiment of the invention. However other embodiments may use different types of software programs.

The JAVA environment software 80 enables computer 34 to execute instructions in JAVA script, schematically indicated 82. The instructions that are executed by the computer in JAVA script are preferably embedded JAVA script commands that are included in the HTML documents which are received through the browser 76. The browser 76 in connection with the JAVA environment software 80 which executes instructions in the embedded JAVA script 82, serve as an HTML document handling software portion for transmitting and receiving HTML documents and TCP/IP messages through the IP port indicated by 78.

10 REQUEST FOR PCT  
15  
20

20

Computer 34 also has executable software therein having a device application portion 84. The device application portion 84 contains executable instructions related to operation of the devices 36. In the preferred embodiment of the invention, the device application portion consists of a plurality of JAVA applets. In the described embodiment the applets are also preferably programs operable to control and keep track of the status of the devices with which they are associated. Certain applets are also preferably operable to configure the browser to communicate messages. Certain applets manage security and authenticate entities that use the ATM.

5

In the described form of the invention, JAVA applets are associated with functions such as enabling the card reader mechanism, notifying the browser when a user's card data has been entered, operating the receipt printer mechanism, operating the journal printer mechanism, enabling the customer keyboard and receiving data input through the keyboard, operating the sheet dispenser mechanism, operating the depository, navigating to document addresses, timing device functions, verifying digital signatures, handling encryption of messages, controlling the mix of bills dispensed from multiple sheet dispenser mechanisms, calculating foreign exchange, and ending a transaction and instructing the browser to return to communication with the home server. Of course, in other embodiments, other applets may be used to control devices and use data to carry out various desired functions with the machine. The device application portion 84 communicates in the computer 34 at an IP port indicated 86.

10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20

In the described embodiment of the invention, the device application portion 84 of the software does not communicate its messages directly to the device interfacing software portion 64. As later explained, this provides heightened security. However it should be understood that embodiments of the invention may provide for the device application portion 84 to directly communicate device operation messages to the device program 70. This may be done either internally using TCP/IP, by delivery of messages in a conventional manner through a queue established in the operating system of the computer that is associated with the software that interfaces with the devices, or by direct call to this software.

20

From the foregoing discussion it will also be appreciated that certain applets in the device application portion 84 may correspond to devices which are not present in all automated teller machines. For example an automated teller machine that operates only as a cash dispenser does

not include a depository mechanism like depository 44. To accommodate the situation where a user requests a transaction that is not physically possible with the ATM 12, the device interfacing software portion 64 may be programmed to provide an appropriate response message to indicate that the function is not available.

5        Alternatively, the device interfacing software portion may include a function which checks for the presence or absence of each type of physical device within the ATM. Information indicative of the devices present in the ATM may be included as part of the messages generated by the ATM. For example, information indicative of the devices which are operative in the ATM may be included as a portion or several parts of the URL addresses to which messages are directed by the ATM. In this way, the URL in the server to which the ATM connects may be configured for providing only HTML documents which correspond to the types of transactions that the ATM is capable of performing. As a result the browser avoids displaying documents which include references to transaction types that the machine is not capable of performing. Thus for example, a machine may avoid producing a display in response to a document which includes a reference to a deposit transaction if the machine does not include a depository.

10        Alternatively the machine may include in memory, data representative of the functional devices included in the machine. This may include for example data representative of a plurality of devices in the machine and the configurations of such devices, or alternatively, a designator such as a machine number sufficient to identify the capabilities of the machine. The device data 20 indicative of the functional devices in the machine is communicated to a server and the server is operative to deliver the appropriate HTML documents for the devices present in the machine. This may be done based on the data corresponding to the device data from the machine or may be

resolved from a memory which holds data representative of the functional devices in a machine associated with a particular designator. Documents selectively delivered by the server to the browser of the machine will include the appropriate references to the functional devices present in the machine. These documents may be static documents or may be generated at run time from sub-documents or otherwise, to provide the appropriate outputs and instructions to the output devices of the transaction machine.

Figure 3 shows the ATM 12 in communication through the intranet 16 with the home bank computer system 14. Computer system 14 includes a proxy server 88. System 14 further includes a home HTTP server 90. Computer system 14 further includes a device server 92. The proxy server, home HTTP server and device server may be included in a single computer as shown, or in other embodiments may be separate computers. Additional servers may be operative in other embodiments.

The home HTTP server 90 is preferably in communication with a data store and is in electronic communication with a back office computer system, schematically indicated 94. Back office computer system 94 is operative to keep track of debiting or crediting customers' accounts when they conduct transactions at the automated banking machines. In addition back office 94 is also preferably operative to track transactions for purposes of accomplishing settlements with other institutions who are participants in the system and whose customers conduct transactions at the ATMs 12.

As later explained, proxy server 88 is also operative in the described embodiment to communicate through the wide area network 18 with foreign servers such as foreign server 96. Foreign server 96 is an example of a server operated by an institution or entity other than the

institution which operates computer system 14. It should be understood that while foreign server 96 is indicated as operated by a "foreign" institution, this is not necessarily indicative that the institution is located in another country from the institution that operates computer system 14. However, it is possible that foreign server 96 could be located in such a foreign country, including a country in which the language spoken is different from that generally used in the country where ATM 12 is located.

5 The conduct of transactions using the ATM 12 is now explained with reference to Figures 3-24. It should be understood that the following described transaction flows are merely examples of the operation of the apparatus and system, and the apparatus and system may be configured and operated in numerous ways to carry out transactions.

10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20

20 At the start of an exemplary transaction, as schematically represented in Figure 3, the browser 76 communicates through the intranet 16 with the proxy server 88. The communication is established preferably in a manner so that HTML documents intended to attract customers to the ATM 12 are displayed on the touch screen 30. This is referred to as the "attract mode." These HTML documents which are processed in the browser to produce the outputs in the form of screens on the touch screen 30 (and/or outputs through other output devices included in the machine) may originate from home HTTP server 90 which is operative to deliver the HTML documents to the proxy server. The home HTTP server sends the messages addressed to the IP port associated with browser 76, so as to cause their display at the proper ATM machine. It should be understood that while in this example, home server 90 is described as communicating with the ATMs through the proxy server 88, the server 90 may in other systems encompassed by the invention communicate directly with the ATMs.

A fundamental advantage of the system is that home HTTP server 90 may deliver documents selectively to the ATMs 12 connected to the intranet 16. These documents may include messages or material tailored to the particular location in which an ATM 12 is located. Examples of particularly tailored screens may include bilingual messages in certain neighborhoods or information concerning currency exchange at various ports of entry. The material or messages could include advertising for various products or services or other material targeted to particular machine locations. The JAVA applets and JAVA script are loaded from a central location providing selective software distribution in the ATMs which may also be used to tailor the ATM to its environment by causing it to access documents which include material intended to be useful in that location, and which is not provided in documents delivered to at least some other machines in the system.

Systems of the present invention may be configured to have selected machines access HTML documents at different addresses, so that the particular documents accessed include the material targeted to users of the particular machine. Alternatively, a machine may communicate machine data indicative of its identity and/or location to a server. From the machine data, and data stored in a data store in connection with the server, the server operates to deliver the documents including the targeted material. This may be accomplished by assembling subdocuments, or otherwise, to generate the documents that will be delivered to the browser of the particular machine. In addition it should be understood that while in the embodiment shown 20 the HTML documents are accessed through a server of an institution associated with the machine, the documents used for the attract mode may be accessed from other servers operated by other entities.

The touch screen 30 in this exemplary transaction sequence displays a screen which includes an icon which indicates in one or more languages that to commence a transaction a user should touch the screen. If a user touches the screen in the area of the icon an input signal is generated. The input signal or HTTP message is transmitted through the browser 76 to the home address of the home HTTP server 90 to which the ATM 12 is currently in communication. The message generated back to the home HTTP server is represented by the arrows directed from the browser 76 to the intranet 16, from the intranet 16 to the proxy server 88, and from the proxy server to the HTTP server 90 in Figure 3.

In response to the home HTTP server 90 receiving the message indicating that a customer has touched the icon on the screen, the home server is operative responsive to the address accessed to send a message through the proxy server 88 (or in other embodiments directly) to the browser 76. This message preferably includes an HTML document which when processed through the browser produces a screen instructing the customer to insert their card into the card reader mechanism 38. The HTML document flow which is represented graphically in Figure 4, preferably also includes embedded JAVA script or other instructions which operate in the JAVA environment to communicate a message to the JAVA applet responsible for enabling the card reader in the device application portion 84. In one preferred embodiment the instructions provide a pointer or tag to the applet which executes responsive to receipt of the document instructions. Of course in other embodiments other software and approaches may be used.

As shown in Figure 5, in response to the embedded JAVA script activating the JAVA applet associated with the enable card reader function, the JAVA applet in the device application portion 84 communicates with the device server 92. The device server 92 includes a device

server program 98 which in the preferred embodiment is a JAVA program that enables communication with the JAVA applets and the device server application 100. The device server 92 further preferably includes a monitor software application 102 which is operative to monitor device operation instructions. The monitor software minimizes the risk of fraud or abuse in a manner later explained.

5  
S  
B  
10  
15  
20  
25  
30  
35  
40  
45  
50  
55  
60  
65  
70  
75  
80  
85  
90  
95  
100  
105  
110  
115  
120  
125  
130  
135  
140  
145  
150  
155  
160  
165  
170  
175  
180  
185  
190  
195  
200  
205  
210  
215  
220  
225  
230  
235  
240  
245  
250  
255  
260  
265  
270  
275  
280  
285  
290  
295  
300  
305  
310  
315  
320  
325  
330  
335  
340  
345  
350  
355  
360  
365  
370  
375  
380  
385  
390  
395  
400  
405  
410  
415  
420  
425  
430  
435  
440  
445  
450  
455  
460  
465  
470  
475  
480  
485  
490  
495  
500  
505  
510  
515  
520  
525  
530  
535  
540  
545  
550  
555  
560  
565  
570  
575  
580  
585  
590  
595  
600  
605  
610  
615  
620  
625  
630  
635  
640  
645  
650  
655  
660  
665  
670  
675  
680  
685  
690  
695  
700  
705  
710  
715  
720  
725  
730  
735  
740  
745  
750  
755  
760  
765  
770  
775  
780  
785  
790  
795  
800  
805  
810  
815  
820  
825  
830  
835  
840  
845  
850  
855  
860  
865  
870  
875  
880  
885  
890  
895  
900  
905  
910  
915  
920  
925  
930  
935  
940  
945  
950  
955  
960  
965  
970  
975  
980  
985  
990  
995  
1000  
1005  
1010  
1015  
1020  
1025  
1030  
1035  
1040  
1045  
1050  
1055  
1060  
1065  
1070  
1075  
1080  
1085  
1090  
1095  
1100  
1105  
1110  
1115  
1120  
1125  
1130  
1135  
1140  
1145  
1150  
1155  
1160  
1165  
1170  
1175  
1180  
1185  
1190  
1195  
1200  
1205  
1210  
1215  
1220  
1225  
1230  
1235  
1240  
1245  
1250  
1255  
1260  
1265  
1270  
1275  
1280  
1285  
1290  
1295  
1300  
1305  
1310  
1315  
1320  
1325  
1330  
1335  
1340  
1345  
1350  
1355  
1360  
1365  
1370  
1375  
1380  
1385  
1390  
1395  
1400  
1405  
1410  
1415  
1420  
1425  
1430  
1435  
1440  
1445  
1450  
1455  
1460  
1465  
1470  
1475  
1480  
1485  
1490  
1495  
1500  
1505  
1510  
1515  
1520  
1525  
1530  
1535  
1540  
1545  
1550  
1555  
1560  
1565  
1570  
1575  
1580  
1585  
1590  
1595  
1600  
1605  
1610  
1615  
1620  
1625  
1630  
1635  
1640  
1645  
1650  
1655  
1660  
1665  
1670  
1675  
1680  
1685  
1690  
1695  
1700  
1705  
1710  
1715  
1720  
1725  
1730  
1735  
1740  
1745  
1750  
1755  
1760  
1765  
1770  
1775  
1780  
1785  
1790  
1795  
1800  
1805  
1810  
1815  
1820  
1825  
1830  
1835  
1840  
1845  
1850  
1855  
1860  
1865  
1870  
1875  
1880  
1885  
1890  
1895  
1900  
1905  
1910  
1915  
1920  
1925  
1930  
1935  
1940  
1945  
1950  
1955  
1960  
1965  
1970  
1975  
1980  
1985  
1990  
1995  
2000  
2005  
2010  
2015  
2020  
2025  
2030  
2035  
2040  
2045  
2050  
2055  
2060  
2065  
2070  
2075  
2080  
2085  
2090  
2095  
2100  
2105  
2110  
2115  
2120  
2125  
2130  
2135  
2140  
2145  
2150  
2155  
2160  
2165  
2170  
2175  
2180  
2185  
2190  
2195  
2200  
2205  
2210  
2215  
2220  
2225  
2230  
2235  
2240  
2245  
2250  
2255  
2260  
2265  
2270  
2275  
2280  
2285  
2290  
2295  
2300  
2305  
2310  
2315  
2320  
2325  
2330  
2335  
2340  
2345  
2350  
2355  
2360  
2365  
2370  
2375  
2380  
2385  
2390  
2395  
2400  
2405  
2410  
2415  
2420  
2425  
2430  
2435  
2440  
2445  
2450  
2455  
2460  
2465  
2470  
2475  
2480  
2485  
2490  
2495  
2500  
2505  
2510  
2515  
2520  
2525  
2530  
2535  
2540  
2545  
2550  
2555  
2560  
2565  
2570  
2575  
2580  
2585  
2590  
2595  
2600  
2605  
2610  
2615  
2620  
2625  
2630  
2635  
2640  
2645  
2650  
2655  
2660  
2665  
2670  
2675  
2680  
2685  
2690  
2695  
2700  
2705  
2710  
2715  
2720  
2725  
2730  
2735  
2740  
2745  
2750  
2755  
2760  
2765  
2770  
2775  
2780  
2785  
2790  
2795  
2800  
2805  
2810  
2815  
2820  
2825  
2830  
2835  
2840  
2845  
2850  
2855  
2860  
2865  
2870  
2875  
2880  
2885  
2890  
2895  
2900  
2905  
2910  
2915  
2920  
2925  
2930  
2935  
2940  
2945  
2950  
2955  
2960  
2965  
2970  
2975  
2980  
2985  
2990  
2995  
3000  
3005  
3010  
3015  
3020  
3025  
3030  
3035  
3040  
3045  
3050  
3055  
3060  
3065  
3070  
3075  
3080  
3085  
3090  
3095  
3100  
3105  
3110  
3115  
3120  
3125  
3130  
3135  
3140  
3145  
3150  
3155  
3160  
3165  
3170  
3175  
3180  
3185  
3190  
3195  
3200  
3205  
3210  
3215  
3220  
3225  
3230  
3235  
3240  
3245  
3250  
3255  
3260  
3265  
3270  
3275  
3280  
3285  
3290  
3295  
3300  
3305  
3310  
3315  
3320  
3325  
3330  
3335  
3340  
3345  
3350  
3355  
3360  
3365  
3370  
3375  
3380  
3385  
3390  
3395  
3400  
3405  
3410  
3415  
3420  
3425  
3430  
3435  
3440  
3445  
3450  
3455  
3460  
3465  
3470  
3475  
3480  
3485  
3490  
3495  
3500  
3505  
3510  
3515  
3520  
3525  
3530  
3535  
3540  
3545  
3550  
3555  
3560  
3565  
3570  
3575  
3580  
3585  
3590  
3595  
3600  
3605  
3610  
3615  
3620  
3625  
3630  
3635  
3640  
3645  
3650  
3655  
3660  
3665  
3670  
3675  
3680  
3685  
3690  
3695  
3700  
3705  
3710  
3715  
3720  
3725  
3730  
3735  
3740  
3745  
3750  
3755  
3760  
3765  
3770  
3775  
3780  
3785  
3790  
3795  
3800  
3805  
3810  
3815  
3820  
3825  
3830  
3835  
3840  
3845  
3850  
3855  
3860  
3865  
3870  
3875  
3880  
3885  
3890  
3895  
3900  
3905  
3910  
3915  
3920  
3925  
3930  
3935  
3940  
3945  
3950  
3955  
3960  
3965  
3970  
3975  
3980  
3985  
3990  
3995  
4000  
4005  
4010  
4015  
4020  
4025  
4030  
4035  
4040  
4045  
4050  
4055  
4060  
4065  
4070  
4075  
4080  
4085  
4090  
4095  
4100  
4105  
4110  
4115  
4120  
4125  
4130  
4135  
4140  
4145  
4150  
4155  
4160  
4165  
4170  
4175  
4180  
4185  
4190  
4195  
4200  
4205  
4210  
4215  
4220  
4225  
4230  
4235  
4240  
4245  
4250  
4255  
4260  
4265  
4270  
4275  
4280  
4285  
4290  
4295  
4300  
4305  
4310  
4315  
4320  
4325  
4330  
4335  
4340  
4345  
4350  
4355  
4360  
4365  
4370  
4375  
4380  
4385  
4390  
4395  
4400  
4405  
4410  
4415  
4420  
4425  
4430  
4435  
4440  
4445  
4450  
4455  
4460  
4465  
4470  
4475  
4480  
4485  
4490  
4495  
4500  
4505  
4510  
4515  
4520  
4525  
4530  
4535  
4540  
4545  
4550  
4555  
4560  
4565  
4570  
4575  
4580  
4585  
4590  
4595  
4600  
4605  
4610  
4615  
4620  
4625  
4630  
4635  
4640  
4645  
4650  
4655  
4660  
4665  
4670  
4675  
4680  
4685  
4690  
4695  
4700  
4705  
4710  
4715  
4720  
4725  
4730  
4735  
4740  
4745  
4750  
4755  
4760  
4765  
4770  
4775  
4780  
4785  
4790  
4795  
4800  
4805  
4810  
4815  
4820  
4825  
4830  
4835  
4840  
4845  
4850  
4855  
4860  
4865  
4870  
4875  
4880  
4885  
4890  
4895  
4900  
4905  
4910  
4915  
4920  
4925  
4930  
4935  
4940  
4945  
4950  
4955  
4960  
4965  
4970  
4975  
4980  
4985  
4990  
4995  
5000  
5005  
5010  
5015  
5020  
5025  
5030  
5035  
5040  
5045  
5050  
5055  
5060  
5065  
5070  
5075  
5080  
5085  
5090  
5095  
5100  
5105  
5110  
5115  
5120  
5125  
5130  
5135  
5140  
5145  
5150  
5155  
5160  
5165  
5170  
5175  
5180  
5185  
5190  
5195  
5200  
5205  
5210  
5215  
5220  
5225  
5230  
5235  
5240  
5245  
5250  
5255  
5260  
5265  
5270  
5275  
5280  
5285  
5290  
5295  
5300  
5305  
5310  
5315  
5320  
5325  
5330  
5335  
5340  
5345  
5350  
5355  
5360  
5365  
5370  
5375  
5380  
5385  
5390  
5395  
5400  
5405  
5410  
5415  
5420  
5425  
5430  
5435  
5440  
5445  
5450  
5455  
5460  
5465  
5470  
5475  
5480  
5485  
5490  
5495  
5500  
5505  
5510  
5515  
5520  
5525  
5530  
5535  
5540  
5545  
5550  
5555  
5560  
5565  
5570  
5575  
5580  
5585  
5590  
5595  
5600  
5605  
5610  
5615  
5620  
5625  
5630  
5635  
5640  
5645  
5650  
5655  
5660  
5665  
5670  
5675  
5680  
5685  
5690  
5695  
5700  
5705  
5710  
5715  
5720  
5725  
5730  
5735  
5740  
5745  
5750  
5755  
5760  
5765  
5770  
5775  
5780  
5785  
5790  
5795  
5800  
5805  
5810  
5815  
5820  
5825  
5830  
5835  
5840  
5845  
5850  
5855  
5860  
5865  
5870  
5875  
5880  
5885  
5890  
5895  
5900  
5905  
5910  
5915  
5920  
5925  
5930  
5935  
5940  
5945  
5950  
5955  
5960  
5965  
5970  
5975  
5980  
5985  
5990  
5995  
6000  
6005  
6010  
6015  
6020  
6025  
6030  
6035  
6040  
6045  
6050  
6055  
6060  
6065  
6070  
6075  
6080  
6085  
6090  
6095  
6100  
6105  
6110  
6115  
6120  
6125  
6130  
6135  
6140  
6145  
6150  
6155  
6160  
6165  
6170  
6175  
6180  
6185  
6190  
6195  
6200  
6205  
6210  
6215  
6220  
6225  
6230  
6235  
6240  
6245  
6250  
6255  
6260  
6265  
6270  
6275  
6280  
6285  
6290  
6295  
6300  
6305  
6310  
6315  
6320  
6325  
6330  
6335  
6340  
6345  
6350  
6355  
6360  
6365  
6370  
6375  
6380  
6385  
6390  
6395  
6400  
6405  
6410  
6415  
6420  
6425  
6430  
6435  
6440  
6445  
6450  
6455  
6460  
6465  
6470  
6475  
6480  
6485  
6490  
6495  
6500  
6505  
6510  
6515  
6520  
6525  
6530  
6535  
6540  
6545  
6550  
6555  
6560  
6565  
6570  
6575  
6580  
6585  
6590  
6595  
6600  
6605  
6610  
6615  
6620  
6625  
6630  
6635  
6640  
6645  
6650  
6655  
6660  
6665  
6670  
6675  
6680  
6685  
6690  
6695  
6700  
6705  
6710  
6715  
6720  
6725  
6730  
6735  
6740  
6745  
6750  
6755  
6760  
6765  
6770  
6775  
6780  
6785  
6790  
6795  
6800  
6805  
6810  
6815  
6820  
6825  
6830  
6835  
6840  
6845  
6850  
6855  
6860  
6865  
6870  
6875  
6880  
6885  
6890  
6895  
6900  
6905  
6910  
6915  
6920  
6925  
6930  
6935  
6940  
6945  
6950  
6955  
6960  
6965  
6970  
6975  
6980  
6985  
6990  
6995  
7000  
7005  
7010  
7015  
7020  
7025  
7030  
7035  
7040  
7045  
7050  
7055  
7060  
7065  
7070  
7075  
7080  
7085  
7090  
7095  
7100  
7105  
7110  
7115  
7120  
7125  
7130  
7135  
7140  
7145  
7150  
7155  
7160  
7165  
7170  
7175  
7180  
7185  
7190  
7195  
7200  
7205  
7210  
7215  
7220  
7225  
7230  
7235  
7240  
7245  
7250  
7255  
7260  
7265  
7270  
7275  
7280  
7285  
7290  
7295  
7300  
7305  
7310  
7315  
7320  
7325  
7330  
7335  
7340  
7345  
7350  
7355  
7360  
7365  
7370  
7375  
7380  
7385  
7390  
7395  
7400  
7405  
7410  
7415  
7420  
7425  
7430  
7435  
7440  
7445  
7450  
7455  
7460  
7465  
7470  
7475  
7480  
7485  
7490  
7495  
7500  
7505  
7510  
7515  
7520  
7525  
7530  
7535  
7540  
7545  
7550  
7555  
7560  
7565  
7570  
7575  
7580  
7585  
7590  
7595  
7600  
7605  
7610  
7615  
7620  
7625  
7630  
7635  
7640  
7645  
7650  
7655  
7660  
7665  
7670  
7675  
7680  
7685  
7690  
7695  
7700  
7705  
7710  
7715  
7720  
7725  
7730  
7735  
7740  
7745  
7750  
7755  
7760  
7765  
7770  
7775  
7780  
7785  
7790  
7795  
7800  
7805  
7810  
7815  
7820  
7825  
7830  
7835  
7840  
7845  
7850  
7855  
7860  
7865  
7870  
7875  
7880  
7885  
7890  
7895  
7900  
7905  
7910  
7915  
7920  
7925  
7930  
7935  
7940  
7945  
7950  
7955  
7960  
7965  
7970  
7975  
7980  
7985  
7990  
7995  
8000  
8005  
8010  
8015  
8020  
8025  
8030  
8035  
8040  
8045  
8050  
8055  
8060  
8065  
8070  
8075  
8080  
8085  
8090  
8095  
8100  
8105  
8110  
8115  
8120  
8125  
8130  
8135  
8140  
8145  
8150  
8155  
8160  
8165  
8170  
8175  
8180  
8185  
8190  
8195  
8200  
8205  
8210  
8215  
8220  
8225  
8230  
8235  
8240  
8245  
8250  
8255  
8260  
8265  
8270  
8275  
8280  
8285  
8290  
8295  
8300  
8305  
8310  
8315  
8320  
8325  
8330  
8335  
8340  
8345  
8350  
8355  
8360  
8365  
8370  
8375  
8380  
8385  
8390  
8395  
8400  
8405  
8410  
8415  
8420  
8425  
8430  
8435  
8440  
8445  
8450  
8455  
8460  
8465  
8470  
8475  
8480  
8485  
8490  
8495  
8500  
8505  
8510  
8515  
8520  
8525  
8530  
8535  
8540  
8545  
8550  
8555  
8560  
8565  
8570  
8575  
8580  
8585  
8590  
8595  
8600  
8605  
8610  
8615  
8620  
8625  
8630  
8635  
8640  
8645  
8650  
8655  
8660  
8665  
8670  
8675  
8680  
8685  
8690  
8695  
8700  
8705  
8710  
8715  
8720  
8725  
8730  
8735  
8740  
8745  
8750  
8755  
8760  
8765  
8770  
8775  
8780  
8785  
8790  
8795  
8800  
8805  
8810  
8815  
8820  
8825  
8830  
8835  
8840  
8845  
8850  
8855  
8860  
8865  
8870  
8875  
8880  
8885  
8890  
8895  
8900  
8905  
8910  
8915  
8920  
8925  
8930  
8935  
8940  
8945  
8950  
8955  
8960  
8965  
8970  
8975  
8980  
8985  
8990  
8995  
9000  
9005  
9010  
9015  
9020  
9025  
9030  
9035  
9040  
9045  
9050  
9055  
9060  
9065  
9070  
9075  
9080  
9085  
9090  
9095  
9100  
9105  
9110  
9115  
9120  
9125  
9130  
9135  
9140  
9145  
9150  
9155  
9160  
9165  
9170  
9175  
9180  
9185  
9190  
9195  
9200  
9205  
9210  
9215  
9220  
9225  
9230  
9235  
9240  
9245  
9250  
9255  
9260  
9265  
9270  
9275  
9280  
9285  
9290  
9295  
9300  
9305  
9310  
9315  
9320  
9325  
9330  
9335  
9340  
9345  
9350  
9355  
9360  
9365  
9370  
9375  
9380  
9385  
9390  
9395  
9400  
9405  
9410  
9415  
9420  
9425  
9430  
9435  
9440  
9445  
9450  
9455  
9460  
9465  
9470  
9475  
9480  
9485  
9490  
9495  
9500  
9505  
9510  
9515  
9520  
9525  
9530  
9535  
9540  
9545  
9550  
9555  
9560<br

*SLB 2*  
there is no basis for stopping the transaction, transmits an HTTP record including card data back through the intranet 16 to the device application portion 84.

In one preferred embodiment of the invention, the card input by a user or customer includes indicia which corresponds to an address associated with the user in the network. In such an embodiment the indicia corresponds to a uniform resource locator ("URL") address which provides information on the computer where the user information resides, as well as a directory or subdirectory which includes the user information and the name of the document or resource that includes the user information. The URL address may be encoded on a customer's card. The address may be encoded on track 3 of a magnetic stripe, in other locations within the magnetic stripe data or through encoding other readable indicia on the card. Alternatively, if the customer's card is a "smart" card which includes semiconductor storage thereon, the URL address associated with the customer may be included as part of the stored data on the integrated circuit chip on the customer's card. Alternatively, a URL could be derived from other data on the card by accessing a data base in which address data is correlated with other data read from the card. The data necessary to derive the address for accessing documents associated with a customer could also be derived from inputs to input devices other than or in addition to card data, including for example biometric data which is input by a customer through a biometric reading device. Such biometric data may include for example, data corresponding to one or more fingerprints, data from the user's appearance or combinations thereof.

20 For example and without limitation, data input by a customer such as through a card input to a card reader may correspond to an address for accessing an HTTP record, which may be a file or document which includes information which can be used for verifying the identity of a user.

This record could include data corresponding to a PIN number. The information may include biometric data corresponding to the authorized user of the card. The browser may access the record and use the contents of the record such as data and/or instructions to verify that the indicia corresponding to biometric data in the record corresponds to the biometric data of the user

5 entering the card. Alternatively, input data representative of appearance, voice, other features (or combinations thereof) or other input data, may be used to generate one or more addresses which correspond to a user, and the content of the record at the accessed address used to verify that the user at the machine corresponds to the user associated with the record. Numerous approaches within the scope of the invention may be used. The information in the record corresponding to a user may likewise be used to authorize certain functional devices on the machine to operate for the user while other devices may not. For example, a user who is overdrawn may have information in the record accessed that prevents them from actuating the cash dispenser, while users who are not overdrawn may include information which enables such operation. Alternatively, the absence of information in a corresponding record may enable operation, while the inclusion of information selectively limits the operation of devices.

10  
15  
20

Returning to the exemplary transaction, the delivery of the card data from a successfully read card is delivered responsive to the programming of the device application portion 84 to a JAVA applet associated with notifying that the card data has been entered. In response, the JAVA applet operates to generate JAVA script which configures the browser with the URL address corresponding to the data read from the card. The JAVA applet is also preferably operative to open a record schematically indicated 104 concerning the transaction, which includes the user's URL address, the time and other card data. This record in a preferred

embodiment may be stored in memory as data in an object in software. The object is preferably used to accumulate data as the transaction proceeds. The data stored in the transaction data object preferably includes data input through input devices by the user as well as data representative of operations carried out by transaction function devices.

5 The record or transaction data object provides persistence through what may be several different transaction steps executed by the customer. The ability to use and share the data in a number of different operations avoids the need to derive it or obtain it from a customer more than once in the course of a user session involving a number of transaction steps. The use of a transaction data object enables applets to run largely independently, obtaining needed data from the transaction object. The approach also enables the record or data object to be used to produce an appropriate record at the end of the transaction session. This record may be stored, collected into a batch or delivered to selected addresses in a local or wide area network.

0  
10  
20  
30  
40  
50  
60  
70  
80  
90

20

As schematically shown in Figure 7, in response to the browser 76 receiving the URL address data, the browser is operative to transmit a message through the intranet 16 to the proxy server 88. For purposes of this example, the URL address associated with the card data is that of a customer associated with the home bank which operates system 14. As a result, the customer's URL address will cause the message to be directed from the proxy server 88 to the home HTTP server 90 and to access the corresponding document at the address therein. Alternatively, in other systems the connection may be made directly with server 90 without the intervening proxy server 88. As previously discussed, the URL address may also include data representative of the devices which are operative in the ATM.

In response to receiving the message, home HTTP server 90 finds the data corresponding to the customer's URL address data in its associated memory and delivers to the browser at its IP port with an HTML document. This HTML document may include a screen acknowledging the particular customer by name as well as with the name of the banking institution or other entity which operates the home bank computer system 14.

In addition, the HTML document preferably includes embedded JAVA script which has a digital signature or a means to obtain a digital signature associated with the home HTTP server 90. The script instruction included in the document in certain embodiments causes the device application portion to access an HTTP address on a server, which in the described embodiment is server 90. The HTTP address corresponds to an HTTP record which includes at least one instruction and preferably includes a program such as a JAVA applet or Active-X file. The instruction is used to operate the appropriate transaction function device. The HTTP record preferably includes data representative of a signature, such as a digital signature. This digital signature is received responsive to the JAVA script 82 and processed in the device application portion 84. A JAVA applet processes the digital signature to authenticate it and if it is an acceptable signature authorizes operation of the banking machine. In certain embodiments the applet may compare the signature to signature data stored in memory for a predetermined relationship, such as a match.

After the applet verifies that HTTP server 90 or other accessed HTTP record has sent a proper digital signature, the transaction will be allowed to continue. If for some reason a proper digital signature has not been sent, the JAVA applet will stop the transaction and return banking machine 12 back to the condition prior to the start of the transaction by connecting the ATM to

the address associated with the attract mode in home server 90. The use of signed instructions may be used to assure that the various transaction function devices are only operated in response to appropriate messages. The use of signed instructions may be particularly appropriate for instructions that run the sheet dispenser or otherwise provide value to the user of the machine.

5 In the example it will be assumed that the digital signature received is a proper signature, in which case a message is returned from the browser 76 to home server 90 indicating that the transaction may proceed. As shown in Figure 8, in this exemplary transaction the HTTP home server 90 then operates to send an HTML document to the browser 76 which includes instructions which when processed produce a page or screen which instructs the customer to enter their personal identification number or PIN. This HTML document preferably includes embedded JAVA instructions which operate to cause the device application portion 84 enable the keyboard 40 of the ATM so the machine may receive the PIN number. Such a message is schematically shown in Figure 8 with the JAVA script 82 signaling the JAVA applet responsible for the keyboard that it has been requested to enable the keyboard. In response the JAVA applet in the device application portion 84 sends a message through the intranet 16 to the device server 92. The device server 92 sends a message back through the intranet to the device interfacing software portion 64 in the ATM. The instructions in this message causes the device software to enable keyboard 40. The JAVA applet responsible for enabling the keyboard is also preferably operative to update the transaction record 104 to indicate that the PIN was requested.

20 As shown in Figure 9, the PIN entered through the keyboard 40 is transmitted in a message from the device interfacing software portion 64 to the device server 92. The device server 92 returns a message to the responsible JAVA applet in the device application portion.

The JAVA applet then operates to send a message back through the HTML document handling portion and the browser 76 to the HTTP address of home server 90. This message includes data representative of the PIN input by the customer. In some embodiments it is not desirable to display the customer's PIN on the screen. In such embodiments the keyboard applet may be operative to display a default character on the screen such as a "\*" symbol or other symbol in lieu of the PIN digits. Further as later discussed it may be desirable to avoid transmission of PIN or other data through the browser, in which case PIN data may be handled as a separate HTTP message or in other manner to reduce the risk of disclosure.

The software operating in connection with HTTP server 90 is then operative to either verify the PIN itself or to verify the customer's PIN number and account number by sending it to the back office 94 and waiting for a response. Alternatively, customer PIN verification may be carried out in the ATM through an appropriate applet. This can be done in situations where data on a customer's card, such as an account number, can be correlated to the customer's PIN number through an algorithm. The embedded JAVA script in the HTML messages may include or point to an address to obtain the data and/or instructions which the applet uses to perform this verification function, including certain encryption key data. This may include user information in the HTML document or other record data that was accessed in response to the user's card data. As shown schematically in Figure 9, the transaction data object 104 is also appropriately updated by the applet to indicate the entry of the customer's PIN.

In alternative embodiments the machine may include a biometric reader device or other input device to accept data from a user. The user may input data through such a device which may be used in lieu of, or in addition to, PIN data to verify that the user is an authorized user.

This may be done for example by comparing the user data input to information corresponding to the authorized user of the card included in a record or a document which has an HTTP address and is accessed by a browser or by an HTTP client application through an HTTP server in response to card data. Alternatively input data may be used to generate addresses for documents or records which are accessed by the browser or client, and which records or documents contain information that is used to verify the user's identity. For example, data concerning users may be stored in a data store in connection with an HTTP server, which delivers data from a record responsive to the user data, which is used to verify the user's identity.

It should be noted that the page or screen which requests the customer to enter their PIN is shown generated from the home HTTP server 90. This is preferably a screen that is associated with the particular customer's URL address. This will be the interface of the customer's home bank and will be familiar to the customer. Alternatively, the customer address may access what may be essentially the customer's personal "home page" with the institution that operates computer system 14. As such, it is not only something the user is familiar with, but is ideally tailored to the user's particular transaction needs.

Alternatively, the document(s) or record(s) which contain the customer data may be used to generate the addresses for other documents. The information may also be used to generate a document for the particular customer in the particular circumstances. This approach may be useful to reduce the effort associated with developing in advance a personal visual page or document for each customer.

Approaches for accomplishing this may involve including various types or categories of user information in the document(s) or record(s) that pertain to a particular customer. This may

include information such as gender, related persons, account types, permitted transactions, customer preferences, customer interests, account balances, previous offers declined or accepted and other information. This customer information can be used by an appropriate applet among applets 86 to address and/or develop an appropriate document for the browser to access based on the customer "profile". In addition, the profile applet may take into consideration the transaction devices present in the particular machine, information on which is stored in a data store in the machine or elsewhere in the system, as well as other factors such as the day of the week and time of day based on a system clock. In this way the machine determines the appropriate document to access or generate for the particular customer under the particular circumstances.

The logic used in the profile applet may act to cause documents to be built or accessed for the customer which includes transaction options based on the customer information, information about the terminal and other factors. The profile applet may operate to offer transaction options or information selectively based on the customer information. For example, the operator of the machine may offer incentives, premiums, additional transaction options or advertising information selectively to customers. Certain types of customers of the institution operating the machine may receive screen outputs with options that encourage them to do more business or different types of business with the institution. Likewise, customers that are identified as customers of foreign institutions may be provided with incentives to do business with the institution operating the machine.

20 The profile applet may operate to cause the computer to access other documents in other servers, such as stock market data, and selectively provide it to customers. It should be understood that the profile applet may operate to determine an address or generate documents to

produce initial display screens of a transaction sequence. The profile applet may also operate to provide information or access or produce documents to generate visual outputs to the customer at other points in a transaction or between transactions. This may further be used in systems in which the operator of the machine is able to sell paid advertising to third parties and then access 5 the HTTP records such as HTML files for those third parties' products or services. Such accessing may be done based on a periodic or other basis, but may be done effectively by selecting the HTTP record to access in response to the profile of the particular customer.

The continuation of the transaction flow for this exemplary transaction by a customer of the institution that operates computer network 14, is schematically shown in Figure 10. The 10 home HTTP server 90 is operative in response to the customer inputting the correct PIN to send HTML documents to the HTML document handling portion of the software in the computer which operates the ATM. These messages may include information used to generate screens which prompt the customer to select a transaction. For purposes of this example, it will be assumed that the customer inputs at the touch screen 30 a selection which corresponds to the 15 dispense of cash, which is a common transaction at an automated banking machine.

The selection of the customer through the input device of the touch screen is communicated back through the HTML document handling portion which communicates an 20 HTTP message to the home HTTP server 90. Server 90 then responds by sending another HTML document to the banking machine which prompts the customer to select an amount.

Again the customer may input a selection on the touch screen which indicates the amount of cash requested by the customer. This HTTP message passes through the HTML document handling portion and the browser 76 to the home server 90.

In response to the receipt of amount data from the customer, the home server 90 is preferably operative to communicate electronically with the back office 94 to verify that the customer has the amount requested in their account. This is preferably accomplished through a Common Gateway Interface (CGI) 106 which is in operative connection with the home server 90.

5 For purposes of this transaction it will be assumed that the back office 94 indicates that the money is available in the customer's account and sends a message through the CGI 106 to the home server 90 indicating that it may proceed.

As schematically represented in Figure 11, the home server 90 then operates to send a document back to the HTML document handling portion in the ATM software. This message preferably will cause information to be displayed on the screen which advises the customer that the transaction is being processed. In addition the HTML document returned preferably includes JAVA script which include embedded instructions which are executed and communicated to a JAVA applet associated with the operation of the sheet dispensing mechanism 42.

The document returned from the home server 90 may include advertising or other information instead of or in addition to the customer message. The document returned may also include an instruction which causes the machine to access or generate another document. These instructions may invoke methods in the profile applet which depend on the properties associated with the customer, the machine, the current time and/or other circumstances. This enables accessing documents that provide promotional messages such as advertising or other information to the customer while the customer is waiting for the machine to operate. It should be understood that these documents may be accessed anywhere, including from the Internet. This makes it possible to selectively present a wide range of materials to customers. It also enables

operators of ATMs and other transaction machines to present advertising to customers, on a broad basis, or targeted to categories of customers or even targeted to individual customers on a segment of one basis. This could be advertising of the machine operator such as a bank, or advertising pertaining to virtually any type of goods or services. The advertising may also be selectively presented based on the particular transaction device being operated, the amount of funds involved or other parameters. The HTML documents also enable the presentation of video and sound to the customer which may enhance the effectiveness of promotions.

The message to the JAVA applet in the device application portion 84 of the software to initiate operation of the sheet dispenser results in generation of a message to the device server 92. The message to the device server 92 to dispense cash is preferably analyzed by the monitor software 102 to check to see if the message is appropriate. For example the monitor software 102 is preferably operative to assure that the amount of cash being requested does not exceed a preset amount. It can also optionally check to verify that the amount provided to this customer within a prior period has not exceeded an amount. This may be done by the device server sending a message to the back office which includes the card data it has previously received from this customer. This message may pass through server 90 and its associated CGI, or other connection. Assuming that the dispense instruction is not prevented by a message from the back office or the monitor software, the device server 92 is operative to send a dispense message to the device interfacing software portion 64 in the ATM. The software portion 64 is thereafter operative responsive to the message to operate the sheet dispensing mechanism 42 to dispense the amount of cash requested by the customer.

The monitor software 102 preferably performs additional functions in the device server.

For example, government regulations or good business practice may require limiting the size and amounts of deposits which may be made into an ATM. This may be advisable to prevent "money laundering" or other suspicious activities. The monitor software preferably operates to limit the amount of any single deposit to below a set limit. It further operates by communicating with the home bank back office system 94 to prevent a series of deposits within a preset time from exceeding a certain limit. The monitor software may also work in connection with the proxy server to limit certain transactions that may be carried on at the banking machine responsive to instructions from foreign servers as later discussed.

10 It should be noted that in a preferred embodiment of the invention the JAVA applet which is operative to send the message which causes cash to be dispensed, works in connection with another applet which controls the mix of bills dispensed to a customer. Many automated teller machines have the ability to dispense two or more denominations of currency bills. It is desirable to control the mix of bills dispensed to a customer to suit that which is available in the machine and to avoid running out of one denomination of bills before the other. The bill mix applet is preferably operable to control the bill mix in accordance with the desires of the institution operating the ATM machine as well as is in accordance with the ATM machine's capabilities. Alternatively, a JAVA applet for controlling bill mix may reside in device program 70 in device interfacing software portion 64.

20 As will be appreciated by those skilled in the art, the particular JAVA applets and/or configuration data in the machine may be selectively loaded from the home server 90 at machine start up or at other times. Because the applets and configuration data may be selectively

delivered to particular machines, the machines may be tailored specifically to the particular ATMs currency dispensing and other capabilities. For example, the ATM may be configured so that certain applets or groups of applets must be present to enable the machine to operate. One approach to loading such data or programs is to provide address values in the terminal software to indicate where the needed instructions to acquire the applets or data may be obtained. If the applets or groups of applets are not already present in memory of the ATM terminal at start up, the software is operative to access the system addresses for the documents which contain the required records or instructions which will cause the machine to load the required records. The browser may be used to access the addresses and the software loads data corresponding to the instructions from the accessed documents into a memory in the ATM terminal so that the terminal has the required applets and data. Such document addresses may be accessible through the home server 90. Alternatively the addresses may be on a separate development server connected to the intranet 16. In this way each transaction machine is able to load the applets and data which include the operative code it needs to operate the transaction devices in the machine. Alternatively, the documents may be provided through a development server or other server that is accessible to the machine through a wide area network. The documents may be provided on the development server to provide the machine with instructions on how to acquire the operating code to carry out a wide variety of functions. The instructions may direct the machine to acquire the necessary data and code from addresses accessible through HTTP servers by an HTTP client in the machine. The data and code can be acquired responsive to instructions in one or several documents. The machine may also require that the applets loaded in this manner be signed

applets including digital signatures or other authenticating features to achieve operation of certain devices in the machines.

Alternatively, embodiments of the invention may acquire the necessary applets and data from a remote data store. The data store preferably includes the data and/or programs that enable the machine to operate as desired or have instructions on where the machine may acquire the necessary instructions and data for operation. The data may be accessible from a data base server. The transaction machine addresses a query to the database server. The query includes or is accompanied by indicia from the machine which identifies the machine. This may be the particular machine such as a machine number, and/or may include indicia representative of the type or functional device capabilities of the machine.

The data store preferably includes records which have the data or programs that are to be transmitted to the machine. In response to the query to the server, the server retrieves records from the data store and responsive thereto delivers one or more messages to the HTTP client in the transaction machine. This message(s) includes the configuration data or applets to enable the machine to operate in the manner desired or may include instructions which indicate how the machine is to acquire such programs from servers connected in the system.

In the example shown the configuration server and data store may operate on the same computer as home bank server 90. In other embodiments the database server may reside elsewhere in the networks to which the machine is connected.

An advantage of the machines and systems which employ such features is the flexibility to change the operation and customer interface of the machine to respond to changing conditions. This may include a change in a transaction function device. Conditions may change so that

certain transactions are limited or are not available. For example, a machine may normally accept deposits but its depository is full. In that situation the machine may change the documents it accesses to present messages to users through its output devices so that the deposit option is no longer offered. This can be accomplished by the applets and data loaded into the machine initially, which provide for instructions when such event is sensed. Alternatively, the machine programming may be modified by loading new applets and/or data from an HTTP server responsive to its then current status. This may be done responsive to a query to a database server which includes or is accompanied by data representative of the changed conditions or capabilities of the machine. In response the server delivers the applet(s), data and/or instructions which will operate the machine in the modified mode.

This approach eliminates the situation with conventional transaction machines where the static interface presentation on output devices offers a transaction option to a customer. Sometimes, after the customer has made the selection an indication is given that the selected transactions option is not available. The approach described herein may be used with numerous transaction options and variations of transactions. The transaction options can be readily changed from the database server on a machine by machine basis or even a customer by customer basis as previously discussed, based on the desires of the entity operating the transaction machine.

The discussion of the exemplary transaction will now be continued. In response to the cash dispenser 42 dispensing the requested amount of cash, device interfacing software program 64 preferably operates to send a dispense operation message confirming the dispense back to the JAVA applet responsible for the dispense in the device application program 84. As represented

5

in Figure 12, the particular applet is operative to update the transaction record 104 to indicate the dispense of currency to the customer in the particular amount. The embedded JAVA script instructions which were operative to cause the dispense of currency to the customer, also preferably include instructions to send a confirming message back to the home server 90 that the dispense is complete. The receipt of the dispense operation message indicating the cash was dispensed causes the JAVA applet to configure the HTML document handling portion to send a device response message back to the home server. The home server then is preferably operated in accordance with its programming to indicate to the back office 94 that the customer received the amount of funds dispensed. This amount is deducted from the customer's account in the records maintained by the back office system.

FO  
RE  
ST  
C  
O  
D  
E  
15  
J  
20  
0  
6  
0

20

Generally during a transaction it is common to ask the customer if they wish to have a receipt for the transaction. This may be done at various times during the transaction flow. In the present example, after the cash has been dispensed the customer operating the machine is sent such a message as reflected in Figure 13. The home server 90 is operative to send an HTML document which includes a screen asking the customer if they would like a receipt. This message is displayed as part of a page on the touch screen 30 responsive to receipt of the message through the browser 76. Alternatively the document may be generated by the machine. In response to the customer indicating that they do or do not want a receipt, a message is returned to the home server. Again it should be understood that the screens displayed to the customer are preferably those that the customer is accustomed to from his or her home institution, and may be a part of his or her unique home page.

Assuming that the customer wishes to receive a transaction receipt, the home server 90 operates as shown in Figure 14 to send a document back to the ATM with embedded JAVA script indicating that a transaction receipt is to be printed. These instructions in JAVA script are communicated to the device application portion 84 which sends a TCP/IP message through the intranet to the device server 92. The device server 92 in turn communicates a message with instructions to the device interfacing software portion 64 in the ATM. In response to receiving the message, software portion 64 is operative to cause the printer 46 to print the customer's transaction receipt. The JAVA applet responsible for enabling the printer is also preferably operative to update the transaction data object or record 104. As later discussed, the applet which controls the printing of the receipt may obtain the data used in printing the receipt from the transaction data object.

10  
9  
8  
7  
6  
5  
4  
3  
2  
1

It should be understood that even if the customer does not wish to have a receipt it is desirable to print a record of the transaction in hard copy through the journal printer 48. This may be accomplished in response to imbedded instructions which are part of the same document from the home server 90 which causes the transaction receipt for the customer to be printed, or may be part of a separate document which indicates that the customer has declined the option to receive a transaction receipt. Alternatively, the journal printer may be actuated responsive to other applets such as the applet which causes the dispense of cash, or in another manner chosen by the operator of the ATM. As will be appreciated from the foregoing description the operation of the preferred embodiment of the ATM is inherently flexible and programmable to meet the needs of the system operator.

As shown in Figure 15 upon completion of the printing of the transaction receipt, the software portion 64 is preferably operative to send a device operation message to the device server 92 which is indicative that the requested device function was carried out successfully. The device server 92 is operative to send a corresponding device operation message to the device application portion 84, and in the preferred embodiment to the particular JAVA applet 5 responsible for the printing of the receipt. The JAVA applet in turn configures the HTML document handling portion to generate a message back to the home server in the form of a device response message to indicate that the receipt was printed for the customer.

Having received cash and a receipt, the customer is then prompted by a display screen generated from an HTML document from the home server 90, to indicate whether they wish to conduct another transaction. The visual page or screen prompting the customer in this regard is displayed on the touch screen 30. For purposes of this example it will be assumed that the customer does not want another transaction and a message to that effect is returned through the HTML document handling portion back to the home server 90.

As shown schematically in Figure 17 in response to receiving a message that the customer is done, the home server 90 is operative to send a "go home" message to the ATM. This message preferably includes an HTML document which produces a screen display thanking the customer. This message also preferably includes embedded JAVA script which calls the JAVA applet which eventually returns the HTML document handling portion of the ATM back into 20 connection with the URL address on the home server 90 or other address which provides the documents that are used to output the messages for the so called "attract mode". It should be remembered that the script in some embodiments may operate to cause a message to be sent from

the document handling portion to an address on the home server which causes a corresponding HTTP record including the instructions comprising the desired applet to load.

As schematically indicated in Figure 18, the "go home" command applet is operative to configure the browser 76. After the HTML document handling portion is configured by the JAVA applet to return home, the JAVA applet may be configured to deliver to home server 90 information from the transaction record 104 concerning the transaction that was just completed. Because the exemplary transaction was with a customer of the institution that operates the computer system 14, all the data concerning that transaction should already be recorded in the back office 94. However it will be appreciated that this will not be the case if the transaction was conducted in response to messages from a server operated by a different institution. Thus, all or a portion of the information from the transaction record 104 may be delivered in response to a "go home" command to the home server 90 and through the CGI to the back office system 94 where it can be identified as duplicate information and discarded. This may be done using remote method invocation (RMI) to pass or deliver the object to server 90 and then transmitting the data through messages from the server to the back office or through messages or other techniques.

Of course in other embodiments transaction information may be stored in a database for extended periods rather than being returned after each transaction. Alternatively the ATM 12 of the present invention may include applets which are operable to deliver transaction record information to addresses other than that of the home server, if that is desired by the operator of system 14.

The operation of the computer system when a "foreign" user uses the ATM 12 is graphically represented with regard to Figures 19 through 24. A transaction with a foreign user who is not a customer of the institution that operates ATM 12 and computer system 14, will be operated under the control of the home server 90 and will proceed in the manner of the prior example through the point where the customer inputs their card. The customer inputs a card having indicia corresponding to a URL address that does not correspond to the home server 90. The HTML document handling portion is operative to configure a message addressed to access a URL address that corresponds to the indicia on the customer's card or other address responsive to such indicia. This message is delivered to the proxy server 88 which in turn passes the message to the wide area network 18. From the wide area network the message proceeds to the foreign server corresponding to the customer's URL address. For purposes of this example the foreign server corresponds to server 96 which is connected to the Internet.

10  
9  
8  
7  
6  
5  
4  
3  
2  
1  
15  
16  
17  
18  
19  
20

In the preferred embodiment of the invention proxy server 88 includes screening software graphically indicated 107. Screening software is preferably operable to check addresses to which messages are being directed by the ATM and to selectively prevent the sending of messages to particular addresses. This serves as a "fire wall" and is desirable for purposes of preventing fraud in the system.

As shown in Figure 20, the foreign server 96 is preferably operable to communicate HTTP messages, including HTML documents, to the ATM 12 back through the wide area network 18. This may be done using a secure socket connection ("SSC") so as to minimize the risk of interception of the messages. Of course other techniques, including encryption message techniques may be used to minimize the risk of interception of the messages.

As schematically represented in Figure 20 the response document from foreign server 96 preferably includes embedded JAVA script is representative of or corresponds to a digital signature which identifies the foreign server 96. This may be accomplished by loading an HTTP record including a signed applet, as previously discussed. An applet in application portion 84 in the ATM preferably operates to verify the digital signature in the manner described in the prior example, and sends a message indicating that the transaction has been authorized. The digital identity of the foreign institution will be stored in memory in the ATM and eventually recorded in the back office 94.

It should be noted that the HTML documents from the foreign server 96 produce the visual pages or screens of the foreign institution which the foreign customer is accustomed to seeing. These pages may correspond to the foreign user's "home page" which are tailored specifically to the needs of the particular user.

10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20

20

Figure 21 shows an example of a document accessed through the foreign server 96 to the ATM 12. The document from the foreign server may include embedded JAVA script which enables operation of the JAVA applets in the manner previously discussed to operate the devices 36 in the ATM. As shown in Figure 21 the TCP/IP messages to the devices from the JAVA applets pass from the device application portion 84 to the device server 92, and the instructions therefrom to the device interfacing software portion 64 in the ATM. Device operation messages take a reverse path. As these messages pass through the device server 92, monitor software 102 monitors them to minimize the risk of fraud or abuse.

As indicated in Figure 21, the documents from the foreign server 96 may be operative to display at the touch screen 30 a request for the customer to input their PIN. The embedded

JAVA script instructions would, as in the sample transaction previously discussed, include instructions that enable the keyboard 40 to accept the customer's PIN. As in the prior example, a transaction record 104 which includes a shared data object concerning this transaction would be opened by the device application software portion. As previously discussed, provisions may be made to prevent the passage of PIN data through the browser if desired.

Figure 22 indicates the return of the device operation message and PIN data to the JAVA applet, which in turn transmits the data back to the foreign server 96 through the wide area network 18 using the secure socket connection. From this point the transaction proceeds generally as previously described, except that the foreign server 96 sends the HTTP records, including HTML documents, and receives the messages from the document handling portion of the ATM. The foreign server 96 includes the JAVA application software necessary to include the embedded JAVA script in the documents that are sent to the ATM to operate the devices 36 in the machine.

10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20

As the foreign server 96 operates the machine, the monitor software 102 in the device server 92 is operative to monitor the messages in the manner previously discussed. Such monitoring would for example, operate to prevent the dispense of unduly large amounts of currency out of the machine. The monitoring software may also operate to restrict certain foreign institutions to a subset of the transaction machine devices or capabilities. This is done based on data stored in memory which limits the devices or activities that can be carried out from documents at certain addresses. This may be achieved for example through the use of code plugins which implement a class of the transaction objects which limits the operations that can be performed. For example, the operations which enable connection to the foreign server may

40 instantiate the objects which provide specified limited capabilities for messages received from the foreign server. This may for example limit the amount of money dispensed, prevent operation of a check acceptance device, limit the dispense to printed documents such as tickets, prevent operation of the cash dispenser or limit use of the machine in other appropriate ways.

5 This may be done based on the addresses or portions of addresses for documents.

45 If the capabilities of the machine to the foreign customer are limited, the foreign customer may be provided with a visual interface from the foreign bank based on the transactions the machine can perform and that the owner of the machine will allow. As a result the documents accessed at the foreign bank server may be a variation of what the customer would be provided at a machine operated by the foreign bank. This could be based on documents specifically developed for operating foreign machines, or could be a variant of the usual foreign bank interface with visual indications that certain transactions are not available. In some instances the interface may indicate that some transactions are available with an associated service charge.

50 The ATM of the described embodiment may enhance security by limiting the addresses that the browser may access. This may be done by maintaining a list in the memory of the machine. This list may be maintained in HTTP record(s) (including documents) accessible through the home bank's intranet. The machine may access the record periodically and update the memory data. This record may itself require a digital signature corresponding to a signature in the terminal memory before the data will be loaded into terminal memory. This information 20 may also include the instructions and information for the ATM to verify that the messages it receives by accessing documents on the foreign server are genuine. This may include digital signatures which when transferred using public key or private key encryption techniques verify

the messages as genuine. The machine checks to be sure the signature in the records accessed from the foreign server corresponds to the digital signature for that address stored in memory, and enables operation of transaction devices, such as the cash dispenser, only when such correspondence is present. Of course various approaches to verifying and encrypting messages 5 may be used in various embodiments. As used herein signatures or signed record encompass any indicia which is included in or is derivable from a record which is indicative that it is authorized.

As can also be appreciated from the foregoing disclosure, the foreign server 96 may communicate to the user through the touch screen in a language that is different from that normally used by the customers of the institution that operates the computer system 14. As a result the HTML documents may display requests to dispense currency of a type or in an amount which is not included in the ATM. To accommodate this situation an applet is preferably included in the device application portion 84 to deal with requests for foreign currency. The foreign currency applet causes the ATM to send a message back to its home server for purposes of calculating a closest amount which may be provided to the customer in the available currency in the ATM which corresponds to what the customer requested. As will be appreciated, this applet will be operative to call the particular function address within the home server 90 that is capable of providing this function. When the dispense is made the applet is also operative to indicate to server 96 that the amount dispensed differs somewhat from the amount the customer requested. Of course in other embodiments, other approaches may be used. Alternatively an 20 applet in the machine may generate visual displays that show equivalents in local currency when foreign currency amounts are displayed or processed. This may include presenting both amounts on visual displays presented to a user.

As represented in Figure 23, when the foreign customer has completed their transactions as indicated through the touch screen 30, the foreign server 96 is operative to send the "go home" message back to the ATM. The receipt of this message is operative in the manner previously described to cause the device application portion 84 to operate responsive to the embedded 5 JAVA script instructions to configure the HTML document handling portion to cause the browser 76 to reestablish communication with the home server 90, or other designated document address.

As indicated in Figure 24 the applet in the device application portion 84 which processes the "go home" message is preferably operative to reconnect to the home server 90 as well as to send the transaction record information in record 104. This transaction record information which is preferably packaged in a data object, includes the customer name, the foreign institution name, digital identifier, amount information concerning amounts dispensed, transferred or deposited, and all other pertinent transaction data. The transaction data is used by applets in performing transaction steps in which any portion of the data is required. At the completion of the customer's activity at the machine an applet provides a transaction data message which includes at least a portion of the collected data. This data is communicated from server 90 through the CGI 106 to the home bank's back office 94. This information is stored in the back office for later use for purposes of settlement with the foreign bank operating the foreign server 96.

Alternatively or in addition, transaction data may be recorded in the terminal in memory as well 20 as in hard copy on a journal printer. Transaction data may be stored for downloading in a batch or by passing objects including data from many transactions. Batch data may be communicated at times and to addresses as may be stored in memory in the terminal configuration data.

An advantage of embodiments of the invention is that transaction data may be delivered to addresses in a local area network or in a wide area network such as the Internet. This facilitates conducting wide varieties of transactions and enables directing messages related to tracking use (such as for electronic purse type smart cards) or for settlement of various transaction types to a selected system address.

It will be appreciated that the described embodiment of the automated banking machine and system of the present invention provides the advantage that when the machine is connected to a wide area network such as the Internet, customers are able to carry out their banking transactions virtually anywhere in the world. Further, despite the broad capabilities of the system, because the machine may be monitored locally, both in terms of connection and activity, the risk of fraud is minimized.

Embodiments of the invention may include a further feature to facilitate access to documents in the network to which the machine is connected. This feature is operative to determine if an HTTP record such as an HTML document or other item is accessible at an address for downloading before the computer will attempt to access the record. This avoids transaction time outs that might otherwise occur as a result of inability to access a record due to the server through which the record is normally accessed being down. Other embodiments may consider both the size of the record and the transfer rate and determine that a transfer speed for the record is not sufficiently rapid, so that an alternative record should be transferred.

In one embodiment this feature is achieved through use of a separate program or applet which checks to see if a server that the computer will subsequently want to access is alive. The applet operates responsive to receiving an address or portion thereof, to which a connection will

be made. The applet operates to make a socket connection to the address and loads a small but sufficient amount of the record or otherwise operates to determine that the server through which the record must be accessed is alive. In response to the applet verifying the operation of the remote server, or otherwise determining that conditions indicative that the record may be accessed or loaded, the computer then operates so that the browser or similar software component is enabled to navigate to the address at the appropriate time in the transaction sequence. If the applet is unable to detect that the remote server is alive, or determines that it does not appear the record may be successfully accessed or loaded, steps may be taken to access alternative addresses or to discontinue the transaction. Alternative addresses to access may be based on data stored in the memory of the terminal or may be obtained by accessing documents either locally or remotely which include data from which alternative addresses may be obtained or derived. Alternative addresses are similarly checked to make a determination that the records can be accessed before attempts are made to access the alternative records. This approach avoids delays in carrying out transactions.

Alternative embodiments may employ other approaches to determine if desired HTTP records such as HTML documents may be successfully accessed and/or downloaded adequately before the browser providing the customer interface attempts to access the document. Such embodiments may consider in determining whether the document can be successfully accessed, the transfer speed or other conditions related to system operation or document content. For example, the applet which tests to determine that the HTTP record can be accessed, or a further applet, may determine the transfer rate at which the record can be transferred to the computer. The rate at which the data can be transferred may be compared to data stored in memory, and if

the rate is slower than the data representative of the desired stored rate an alternative record is accessed. This may be for example an HTML document stored locally in the machine. Other embodiments may include programs which consider the size of the HTTP record and the transfer rate in determining a transfer speed. Such programs then determine if the record can be transferred fast enough to suit the parameters established in the configuration in memory, and if not, alternative addresses are accessed. Such alternative records may be similarly tested for transfer speed before being transferred.

5 Programs may also consider other factors in deciding to access a particular address, such factors may include for example day and time information, or information from sensors such as sensors in a floor indicating that other persons are waiting to use the machine. In this way access to documents that have extensive outputs which may tend to prolong transactions can be avoided even when records can be loaded at an adequate speed.

10 While the described embodiment of the automated banking machine and system of the present invention is shown with regard to a particular type of machine that is made specifically for connectibility to local or wide area networks, conventional automated banking machines may also be adapted to include such capability. Specifically the HTML document handling portion and device application portions may be included with other conventional software which operates within an automated banking machine. This enables such ATMs to operate either in the conventional proprietary network or as part of a wide area network. In addition, automated banking machines may be configured to operate their devices through the device interfacing software portion of the invention or through a different software interface when operating in a conventional network. Such machines may switch to requiring device messages to be passed

through a device server when operating under the control of a server within the wide area network to maintain security within the system. In this way a single ATM could operate in proprietary networks in the manner of current ATMs as well as in the network configuration of the system of the invention.

5 Alternative embodiments of the invention operate to communicate transaction messages used in a proprietary ATM network. This may be accomplished by using a CGI in connection with either the HTML document handling portion of the ATM or the HTTP home server or other server. The CGI operates in connection with a message conversion program and database to cull the necessary data from the HTML documents and response messages and generate the defined transaction request messages appropriate for the proprietary transaction network. Likewise, the message conversion program and CGI operate to receive function command messages from the proprietary network and convert them and generate appropriate HTML documents and/or TCP/IP messages for use by the ATM. Because these proprietary network formats are defined and the data necessary to produce and interpret the messages are known, the use of the ATM 12 directly in a conventional proprietary ATM network is achieved.

10 15 20

Conventional ATM transaction messages are defined layout messages that do not include HTML documents or HTTP messages. An example of known conventional messages used to operate ATMs are Diebold 91X messages. Such messages generally involve transmission of a request message from an ATM in a defined layout including customer input data (account/pin) and an indication of the type and amount of transaction requested. The request message is received by an ATM host computer which sends back a response message with a defined layout which includes an indication whether the transaction is authorized. The ATM then returns

another message to the host computer indicating whether the machine was able to carry out the transaction. The messages used in such conventional proprietary networks generally occupy relatively little band width.

In connecting the ATM of the invention to such a network, a server is provided. The server is in operative connection with a memory which includes a relational database which holds the message conversion and document creation data. In one configuration, the server is connected to the document handling portion through a network, or may reside on the computer of the ATM. The server produces the documents which the browser accesses and which include the transaction device instructions. The server (or a connected server) communicates the conventional messages with the host. One server may provide an interface for several ATMs connected to it in a LAN, or alternatively, each ATM may have its own server operating therein.

The ability of ATM 12 to communicate in a proprietary network also enables operation of the ATM in a manner in which the interface is generated by a user's home institution in the manner previously described, but in which transactions are authorized through messages directed through a proprietary ATM network. This achieves the security of using the proprietary network while providing the customer with the advantages of the familiar home bank interface and/or "personal home page" interface.

In such a configuration the ATM transaction function devices may be operated in a conventional manner in response to conventional ATM transaction messages such as Diebold 91X messages, in the proprietary network. The customer output devices, such as the screen (and speakers if provided) communicate through a browser connected to a local or wide area network. The browser accesses documents to prompt a customer through operation of a transaction, but the

documents do not include instructions which cause operation of devices such as the cash dispenser.

In one configuration the browser may be operated by the computer in response to the status of devices in the machine, as the devices are operated in response to conventional ATM messages. In this manner the browser may be navigated to selected addresses, including addresses which are associated with the customer based on customer input data. However, as the documents received by the browser will not operate the transaction function devices, there is less need for security measures in accessing documents. As a result, the customer may still operate the machine in response to a familiar and unique interface, and marketing information such as advertising or other material may be presented in the transaction sequence.

In other embodiments machines may perform some device functions based on conventional messages, while others may be performed in response to instructions in HTML documents or other HTTP messages. For example HTML documents may provide considerable data for use by printers or other output devices. Some embodiments may access documents with instructions, but may ignore some and act in response to others. The approach may be selected by the systems operator by configuring the software based on their requirements.

A further advantage of the system configuration of one preferred embodiment is that it has enhanced flexibility for communicating messages associated with the ATM. The device manager 68 preferably generates status messages associated with the status of devices 36. These status messages may commonly represent information about conditions which exist at the devices. Such messages may indicate that supplies of paper for printers or currency, are low or are depleted. Other messages may indicate that devices are not functioning properly. Often such

messages indicate that the ATM requires servicing. All such types of messages are referred to herein interchangeably as status or fault messages.

The device interfacing software portion 64 communicates through the intranet 16 using TCP/IP messages. While the messages associated with transactions previously described are directed to the device server 92, the software portion 64 may include a server and be configured to address fault and status messages to other addresses in the intranet or the Internet. For example, such fault or status messages may be directed to a software application which delivers messages to a service provider. Further, fault messages may be selectively directed based on the nature of the fault indicated. For example, fault messages indicative of a need to replenish currency or supplies may be directed to an address in the intranet associated with an entity who has responsibility for replenishing supplies. Alternatively, fault messages which indicate a need for other types of servicing may be directed to an address associated with an entity who can provide the type of servicing required.

Alternatively, the selective dispatching of fault messages to addresses in the intranet 16 may be accomplished by appropriately configuring device server 92. In addition, either software portion 64 or device server 92 may direct fault messages from the ATMs to a fault handling system such as to a computer operating Event Management System™ software available from Diebold, Incorporated. Such software is operative to resolve the nature of the fault condition and to notify appropriate personnel of the corrective action to be taken.

The ATM 12 may further include a software function to assist in diagnosing problems and providing remedial service. As graphically represented in Figure 2, alternative embodiments of the ATM 12 may include a mini-HTTP server 109 which is in communication with the device

interfacing software portion 64. Server 109 is configured to receive device status messages and to produce HTTP records including HTML documents in response thereto, which provide data representative of device status to a diagnostic device 110 such as a hand held computer terminal.

5 Server 109 includes a CGI for interfacing with the device software so that a technician may access the information in the records accessible at the HTTP addresses related to status messages and input test and corrective instructions through diagnostic device 110. The HTTP records and/or HTML documents generated by server 109 may preferably include graphic and audio instructions indicative of conditions such as problems, as well as corrective action data and repair instructions.

10 In alternative versions of the invention the functions of the mini-HTTP server 109 may reside in device server 92. This may be particularly appropriate where the function of the device server resides on the computer in the ATM. Regardless of where the function resides the use of the visual and audio components of HTML documents associated with maintenance and diagnostic messages facilitates servicing of the ATM.

15 These records delivered through the mini-HTTP server include instructions that correspond to the status or fault conditions. Such records or documents may be accessed locally as previously discussed, or remotely. A technician using a hand held computer which includes a browser or other software operative to access the HTTP records may access the documents locally for purposes of maintenance, diagnosis and servicing. In some situations the customer 20 interface and browser associated therewith may be used to access the mini-HTTP server, or a separate browser, display and input devices on the machine and intended for use servicing activity may be used. Alternatively, the fault and status messages may be monitored from

terminals at locations anywhere that are connected in the network. The mini-HTTP server handling status and fault messages may also be configured to send an e-mail or similar message to a selected address whenever a particular condition or group of conditions exist.

A further advantage of this feature is that HTTP messages may also be sent to the mini-  
5 HTTP server to attempt to correct problems. Such messages may include running diagnostic tests and receiving results. It may also include operating devices to test or attempt to clear jams and other malfunctions. This can often be done from remote locations. Of course, when there is a significant risk of unauthorized access to the server handling default or device messages, appropriate security measures should be taken.

10 The HTTP records which indicate the status of the transaction function devices may have different forms depending on the software configuration and the needs of the system operator. In some embodiments the device status information for one or more devices may be represented by indicia contained within a data object. The data object may be transferred to other connected computers to provide the status data. The transfer of the data object may be accomplished by remote method invocation (RMI) for example. The data in the transferred data object may then be used to generate message and/or outputs desired by the system operator. This technique may be particularly useful when the operator wishes to connect the machine to an existing monitoring system and indicia included in the data object can be used to generate outputs or messages indicative of device status that can be processed by the existing system. Plug-ins may further be  
15 used to achieve communication between existing monitoring systems and transaction machines which have different types of status conditions or different types of message formats. This includes machines which have different types of transaction function devices and capabilities.

The technique of transferring a data object may also be used to conduct testing or modification of transaction function devices. For example, indicia in the data object may be modified by a servicer and the object passed back to the machine. The software in the machine may cause the transaction function devices to operate or change conditions or programming in response to the modified data object. This may include for example clearing a fault indication or causing a device to operate to clear a jam or to conduct a test. The results of such activity may be reflected in modified indicia in the data object which may then be transferred to the computer in the diagnostic terminal. Of course, the approaches discussed herein are exemplary and other approaches will become apparent to those skilled in the art from the description herein.

10 Figure 25 shows a schematic view of a network configuration for an alternative embodiment of the automated banking machine of the present invention. The embodiment shown in Figure 25 includes an automated banking machine specifically adapted for operating in connection with conventional automated banking machine systems such as systems which operate using Diebold 91X ATM message formats or other non-HTTP conventional format. A host computer 120 is a conventional ATM host which communicates using such messages. The host communicates with an interface server schematically indicated 122. Interface server 122 operates in the manner previously discussed and is in operative connection with a memory that includes the information necessary to convert HTTP messages that pertain to a transaction request to a 91X request message or other conventional message, which can be handled by host computer 120. Likewise interface server 122 and the instructions and data stored in memory are operative to convert a conventional 91X command message or other conventional command message from the host 120 into HTTP messages which can be used by the automated banking

20

machine to carry out the command. Similarly interface server 122 is operative to receive the  
HTTP messages which correspond to the response of the automated banking machine to the  
commands and to produce a 91X response message or other conventional response message to  
the host. In accomplishing these functions the interface server communicates with a interface  
client 124 which in the preferred embodiment is a COMM plug in which operates on the banking  
5 machine terminal under a Windows NT® operating environment. Interface server 122 also  
includes a command/status gateway 126. The command/status gateway is operative to receive  
command and status messages from the software portions handling the functional devices within  
the machine. The messages concerning the devices are used in producing transaction messages  
to send back to host 120. In addition, the command status gateway portion also produces status  
messages indicative of the status of devices which may also be communicated to the host.

The interface server 122, command status gateway portion 126 and interface client 124  
may reside in software on the automated banking machine terminal. In this configuration the  
terminal appears to the host computer to be a conventional machine. Alternatively interface  
server 122 and command status gateway portion 126 may reside on a separate server, while the  
interface client portion 124 may reside on the terminal. This enables the interface server 122 to  
handle a number of automated banking machines by connecting the machines to the interface  
server through a network.

The alternative configuration of the automated banking machine system shown in Figure  
20 25 is particularly adapted for use in connection with existing ATM system. The machine  
includes an HTML document handling portion 128 which includes a browser which operates in  
the manner of the embodiments previously described. The HTML document handling portion is

alternatively referred to as a browser herein for purposes of simplicity. The HTML document handling portion operates in connection with a network 130 to access HTTP records in the form of HTML documents through servers 132, 134 and 136. For purposes of this example server 132 will be considered the server of the home bank which operates the automated banking machine.

5 The browser portion 128 is enabled to access documents of its home bank for purposes of obtaining content and instructions for purposes of outputting information to customers as well as for operating devices on the machine. Servers 134 and 136 are representative of other servers which the automated banking machine may be instructed to access for purposes of downloading documents which include information or instructions. Often such documents from non-home bank servers will include information which is to be presented to customers such as advertising, promotional material, stock quotations or other types of information. It should be understood that the servers 134 and 136 may be directly connected to network 130 or may be accessed through other networks and servers. In some embodiments such servers may be accessed through the Internet for purposes of providing documents to the automated banking machine.

Document handling portion 128 includes a terminal theater software portion schematically indicated 138. Terminal theater portion 138 is schematically shown in greater detail in Figure 26. Terminal theater portion 138 includes a back stage frame 140 and a theater frame 142. The back stage frame 140 although it resides in the browser, is not visible on the screen of the automated banking machine. The theater frame 142 is a visible frame and controls what is shown to the customer.

As schematically represented in Figure 25 the HTML document handling portion also includes a terminal director portion 144. The terminal director portion includes directors which

are related instances of applets which are used in carrying out particular types of transactions.

The terminal directors generally correspond to the operation of the JAVA applets in the previously described embodiment.

The automated banking machine of the alternative embodiment further includes a transaction services application (TSA) schematically indicated 146. The transaction services application provides security, terminal condition, terminal authorization and key management services within the automated banking machine. The transaction services application includes a function for communicating HTTP messages with the interface server 122. The transaction services application may also communicate through a network such as network 130 in a manner later explained. The transaction services application also provides a server function which enables the transaction services application to carry out the functions of the device server 92 in the previously described embodiment.

The automated banking machine of the alternative embodiment further includes JAVA common device interfaces schematically indicated 148. The JAVA common device interfaces in the preferred embodiment are related instances of applets which control and coordinate the operation of the functional devices 150 of the machines which perform transaction functions.

The functional devices may include devices of the types described in connection with the previous embodiment or other types of devices which operate to carry out a function related to a transaction. The JAVA common device interfaces 148 communicate with the functional devices through common device interfaces schematically represented 152. The common device interfaces (CDIs) provide an interface that controls the electromechanical modules in the functional devices included in the automated banking machine. The common device interfaces

are schematically shown in connection with a diagnostic server 154. The diagnostic server operates in a manner similar to server 109 of the previously described embodiment. The diagnostic server 154 is useful in diagnosing status and in correcting problems with the devices in the automated banking machine.

5 Referring again to Figure 26 the backstage frame 140 within the terminal theater portion 138 is a component called the backstage applet 156. The backstage applet 156 is preferably a relatively thin component. Instructions referred to as script included in documents accessed by the browser selectively cause the backstage applet to notify a terminal director when an action is to take place in response to the instructions included in the accessed document. The backstage applet also operates to request that a new HTML document be accessed. The backstage applet also provides access to the shared transaction data object previously discussed which holds transaction data.

10 The theater frame 142 controls the user interface as seen by the user of the automated banking machine terminal. Client HTML schematically represented 158 in the theater frame 142 defines the identifying indicia associated with events sent to a director manager through the backstage applet and provides an interface to the director manager's public methods. The director manager schematically indicated 160 in Figure 26, has a class which resides in the transaction services application (TSA) 146 as shown. The director manager class residing in the TSA process is operative to load the terminal directors 144 to the HTML document handling 20 portion. The director manager also includes a backstage applet class that resides in the backstage frame 140. The backstage applet class of the director manager provides an interface for the client HTML to make requests on the director manager. Instructions in HTML documents can pass

events through the backstage applet 156 to the director manager. Such events include a request to authorize a transaction. Such requests may also include indications that the customer has completed a transaction or that a document loaded by the browser includes instructions requesting that the session be terminated. Other events which can be passed through the director manager include print events. Other events which can be passed through the backstage applet to the director manager include an indication that an entry was cancelled, or other defined user events.

In response to receiving events the director manager of the embodiment shown responds to instructions in documents accessed by the browser to perform functions which include changing the content of the theater frame 142. The director manager responsive to such instructions, also changes the active terminal director class. The director manager also caches terminal director classes for later use or loads terminal director classes and HTML documents from a list of available servers. The director manager also provides access to the shared transaction data object holding transaction data for a particular transaction. The director manager also sends terminal theater events to the backstage control class of the current terminal director and provides a screen timeout timer. Of course in other embodiments the terminal director may carry out other functions.

In operation of the alternative embodiment shown in Figure 25 the terminal directors 144 in the transaction services application 146 enables selectively accessing documents with the HTML document handling portion 128. The documents accessed may include instructions which are used to operate the automated banking machine and the functional devices thereon. The transaction services application 146 is further operative to communicate the HTTP messages

which are passed to the interface server 122 and which are used to generate conventional ATM messages which can be handled by the host 120. The dispensing of currency and other transfers of value are carried out in response to approval from the host 120, while the interface and other functions are controlled through instructions in documents accessed through the browser.

5 In one preferred embodiment the ATM or other transaction machine communicates with the conventional ATM host by passing the transaction data object between the computer in the ATM and the interface server. This transfer is preferably accomplished by the remote message invocation (RMI) feature of software such as JAVA. Of course other methods for transferring the data object file using HTTP may be used.

10 As previously discussed, the transaction data object holds transaction data. The machine acquires data pertinent to the transaction such as account data from a card, a customer's PIN number, requested transaction(s) and amount(s), and includes this data among the transaction data.

15 Once the data needed to generate a conventional ATM transaction message is represented in the transaction data, the data object is transferred to the interface server. The interface server is in operative connection with a database 123 or other item holding conversion data as schematically indicated. The conversion data is used by the software associated with the server to generate a conventional ATM transaction request message to the host 120. The conventional message may be formatted as a conventional 91X message or other conventional non-HTTP transaction message.

20 After processing the host 120 responds with a conventional response message. The components of the response message are received at the server and processed responsive to the

conversion data to produce modified transaction data in the data object. This modified transaction data preferably includes data indicative of whether the requested transaction is authorized or denied, as well as other data. For example, if the transaction is denied it may include data which is indicative of the reason for the denial.

5 The transaction data object with the modified transaction data is then transferred to the computer operating the ATM by RMI or other transfer method. The transaction services application 146 operating in software receives the data object and operates the transaction function devices responsive to the modified transaction data. The transaction data object has the transaction data therein further modified by the inclusion of information concerning operation of the devices. After the devices have operated, the transaction data object with the further modified transaction data is passed back to the interface server 122. The modified transaction data is then used to generate a message to the ATM host. The message to the host includes data corresponding to the modified transaction data. Usually this message is a conventional non-HTTP completion message indicating whether the transaction was successfully carried out by the transaction function devices.

10 The format of the non-HTTP conventional transaction messages may be readily changed in the described embodiment. This can be achieved through the use of plug-ins. The plug-ins are operative to put data into, and to extract data from, the transaction data object. The plug-ins achieves conversion between the transaction data and desired conventional non-HTTP messages.

15 20 The use of plug-ins enables more readily using the ATM of the described embodiment in connection with varied types of conventional transaction networks.

Transaction data in the transaction data object is also preferably operative to have the computer operate the browser to access selected HTML documents. This may be done to indicate that the transaction is authorized or denied, as well as to access specific documents responsive to components of the message. For example, customers of banks other than the one operating the ATM may be given certain promotions not presented to the bank's existing customers. The transaction data indicative of why a transaction is denied can be used to access documents which provide an explanation, or can encourage the customer to take other action, such as to take a cash advance on a credit card or to apply for a loan.

The system schematically shown in Figure 25 is an example of an automated banking machine system that achieves the wide variety of interface options available through the use of an HTML interface while preserving compatibility with existing banking machine systems and the security techniques associated therewith. Of course in other embodiments alternative approaches and configurations may be used.

10  
11  
12  
13  
14  
15  
16  
17  
18  
19

20

A further advantage incorporated into the system schematically represented in Figure 25 is the ability to operate the software components of the described embodiment of the present invention in existing automated banking machines. As will be appreciated, the handling of HTML documents in conventional computers requires inputs through a QWERTY type keyboard as well as mouse clicks in locations corresponding to icons or other features on HTML documents to successfully navigate and use such documents. Conventional automated banking machines generally do not include a mouse or full keyboard. Rather conventional automated banking machines generally include an alphanumeric keypad similar to that used on telephones, as well as function keys. Embodiments of the present invention enable the operation of the

system with terminals which have such interfaces operate in a manner which attains benefits of the invention.

Figure 27 shows an example of a conventional automated banking machine interface 162. Interface 162 includes an output device which includes a screen 164. Screen 164 may be a CRT, LCD or other conventional display screen. In the embodiment shown screen 164 is not a touch screen as in the previously described embodiment. A plurality of function keys 166 are disposed at locations adjacent to the screen 164. A keypad 168 is also included in the interface 162. Keypad 168 includes alphanumeric keys as well as certain other dedicated keys such as "cancel", "correct" and "ok". Other keys on the keypad are generally blank but in some instances may be used.

100  
99  
98  
97  
96  
95  
94  
93  
92  
91  
90  
89  
88  
87  
86  
85  
84  
83  
82  
81  
80  
79  
78  
77  
76  
75  
74  
73  
72  
71  
70  
69  
68  
67  
66  
65  
64  
63  
62  
61  
60  
59  
58  
57  
56  
55  
54  
53  
52  
51  
50  
49  
48  
47  
46  
45  
44  
43  
42  
41  
40  
39  
38  
37  
36  
35  
34  
33  
32  
31  
30  
29  
28  
27  
26  
25  
24  
23  
22  
21  
20  
19  
18  
17  
16  
15  
14  
13  
12  
11  
10  
9  
8  
7  
6  
5  
4  
3  
2  
1

In the operation of a conventional automated banking machine, screen data which is generated from information stored in the terminal memory produces defined transaction screens which are presented graphically on the screen 164. The screens appear in a sequence in response to the transaction function selected by the customer. Conventional screens also generally include text or graphics representative of selections that can be made by a customer. These text or graphic options generally includes lines or other indicia which extend to the edges of the screen adjacent to one of the function keys 166. A user is enabled to select the options by pressing the function key which is pointed to by the selection. Likewise in the operation of the automated banking machine a user is enabled to input the alphanumeric characters which comprise the PIN number as well as numeric amount information and other instructions by pressing the keys in the keypad 168.

In one embodiment of the present invention the software operated in the automated banking machine operates to convert standard ATM key inputs to operating system events such as a mouse click in a desired location or an input from a QWERTY type keyboard. The software components which enable carrying out this function are shown in Figure 28-30. These functions include a keypad applet 170. The keypad applet 170 in the described embodiment is included among the applets in the terminal directors 144. The keypad applet 170 supports a subset of the keyboard common device interface (CDI) functionality.

The keypad applet 170 coordinates with a keyboard command server which operates in the transaction services application 146. The server in the transaction services application communicates with the common device interface for the keypad and function keys, schematically indicated 172. The key CDI in the preferred embodiment is a JAVA program which is referred to as a wrapper for the common device interface associated with the function keys and the keypad.

10  
11  
12  
13  
14  
15  
16  
17  
18  
19

20

The software further includes a keyboard mapper program schematically indicated 174. The keyboard mapper in the preferred embodiment is in connection with a database 176 which stores a plurality of map sets. In the preferred embodiment the keyboard mapper is an extension of the keyboard class of objects used for operating the keyboard. The keyboard mapper operates to store sets of keymaps in the database 176. This is accomplished by reading information in a configuration database for the ATM to obtain the keymaps that are operated in the particular machine. During operation, the keyboard mapper selects one of the keymaps as the current set. This is done in response to the keypad applet and is based on instructions in HTTP records which are selectively accessed. The keyboard mapper may select keymaps responsive to instructions in

HTML documents loaded through the browser. The keyboard mapper is also operative to enable the keypad and function keys appropriate for the particular mapset selected. The keyboard mapper is further operative responsive to the selected mapset to translate a keypad input signal or a function key input signal into a respective keyboard or mouse input signal which is then delivered to the keyboard input stream or the mouse input stream of the operating system of the computer in which the software operates.

In the preferred embodiment the mapsets are each comprised of hash tables. Keypad objects are stored as values in the hash tables such that each object includes the values and operations necessary to convert any appropriate ATM key event to an operating system input event.

As can be appreciated in the case of function keys adjacent to the ATM screen it may be desirable to provide a mouse input to the mouse input stream that corresponds to a particular coordinate location for the mouse input. This is provided by the keyboard mapper using the selected keymap set. The various keymap sets enable the different function keys to provide different types of inputs to the computer operating system responsive to the HTML document displayed on the browser. Further the keyboard mapper causes the pressing of a selected key to produce an input corresponding to a mouse click at a selected x,y coordinate position on the screen. It should be understood that either keypad keys or function keys can be used to produce mouse inputs. Likewise function key inputs may be converted to keyboard inputs. In some embodiments however it will be desirable to disable the mouse indicator on the screen such that the user does not notice a usual mouse icon. Such disabling may include in some embodiments

reducing the size of the mouse icon such that it is so small that it cannot be readily seen by a user of the machine.

During portions of some transactions it may be unnecessary for the user to press any keys.

In such situations some preferred embodiments of the invention operate to disable the keypad 5 keys and/or function keys. Because resources of the computer are used in polling such keys for inputs, the cessation of such polling during appropriate times enables the computer resources to be devoted to carrying out other functions. This will increase the speed at which other activities may be carried out. This may be accomplished in some embodiments by the keypad applet operating to remove the key devices from a poll list.

Figures 28-30 include schematic depictions of examples of the operation of the keyboard mapper and the keypad applet. Figure 29 shows an example of an input to the keypad 168. In this example the keypad applet 170 generally in response to instructions in an HTTP record such as an HTML document or other events, transmits and enables events to the transaction services application 146. In response a mapset is selected from the database 176 corresponding to the particular map name. The keyboard command server is further operative to enable the appropriate keys of the ATM.

In this example, in response the customer pressing the "OK" key on the keypad the CDI generates an appropriate signal to the transaction services application. As will be noted from Figure 27 a "OK" key is referred to by convention as the "J" key of the ATM interface. The 20 transaction services application transmits the signal generated from the pressing of the "J" key by the customer to the keyboard mapper 174. In response to receiving the signal, the keyboard mapper operates to resolve the object in the mapset corresponding to the map name which will

convert the function key input signal to a keyboard input signal which is recognized by the operating system. By calling the selected object from the mapset, a keyboard input signal is produced and delivered into the keyboard stream of the computer. This is represented by keyboard stream 178. In the embodiment shown the keyboard stream is an input to the Windows NT® operating system. The keypad applet 170 operates to sense the input through its corresponding key listener. Applet 170 is also operative to receive the event and may operate to display an icon or other graphic corresponding to what the customer has input.

Figure 28 shows operation of the keyboard mapper in situations where the transaction services application operates to prevent transmitting the data input by the customer to the applet 170. This may be desirable for example, in situations where the input by the customer is the customer's PIN or other data which is not to be displayed. In these circumstances the transaction services application 146 operates to hold the data input by the customer and to send only a signal representative of a holding character, in this case a "\*" symbol back to the browser. This is done selectively in response to the instructions contained in documents accessed by the browser or in other HTTP records accessed by the computer which indicates that the input by the customer corresponds to their PIN or other data which is not to be sent to the browser. In the example shown in Figure 28 only the holding character is passed through the keyboard mapper to the browser. In situations where the HTTP record accessed invokes methods in which numerical values are to be sent to the browser and/or displayed on the screen (such as the amount of a withdrawal transaction) the signal sent by the transaction services application to the browser is indicative of the numerical value associated with the key pressed.

Figure 30 is a further example of the operation of the keyboard mapper in this case the input corresponds to a function key 166. In this case the input is caused by pressing the function key "A" which is shown adjacent to the upper right hand corner of the screen as shown in Figure 27. The signal generated in response to pressing the function key is passed to the keyboard mapper which in response to the data obtained from the data store 176 outputs a mouse input corresponding to a mouse click. The mouse input includes data representative of the x and y coordinates on the screen where the mouse click is to be provided. This mouse input signal is passed to the mouse stream input schematically represented 180.

As will be appreciated to enable the automated banking machine which processes HTML documents to operate using a conventional ATM interface the mouse input will generally include coordinate locations which correspond to a location on the screen adjacent to the particular function key. This is because the icon, line, text or other indicia which the customer is selecting by pressing the key will preferably appear or extend on the screen adjacent to the key. In this way the customer is aware through the visual presentation what key to press to make a corresponding selection. A number of function keys adjacent to the screen may be operative at any one time. The customer may make selections by pressing a function key at one location and then a function key at another location disposed from the first location. This will result in signals being sent to the mouse stream corresponding to mouse clicks at coordinates on the screen adjacent to the function buttons pressed by the customer. During transactions various combinations of function and keypad keys may be operative and mapped to various keyboard and mouse inputs as determined by the selected mapsets. In addition developers may develop special mapsets corresponding to the particular graphics in HTML documents which are displayed.

In the foregoing manner keypad inputs to a conventional ATM or other automated banking machine keypad can be translated into conventional keyboard or mouse inputs which can be identified and processed in a conventional keyboard input stream or mouse input stream to a computer. Likewise function keys may be translated into mouse inputs at selected locations and delivered into the mouse input stream for processing by the computer or may be converted into keyboard inputs and delivered to the keyboard input stream. A further advantage of the described terminal configuration is that keys may be selectively disabled except when they are needed. This may reduce instances of attempts to improperly access the machine by pressing keys on the keyboard. Further as previously discussed steps may also be taken to disable keys when they are not needed to increase transaction processing speeds.

A further advantage of embodiments of the present invention is the ability of the automated banking machine to provide printed documents based on instructions in HTML documents. Such printed items may include tickets, travelers checks, money orders, bank checks, scrip or other types of documents. The ability of preferred embodiments to access and process HTML documents enables the printing of graphics and other indicia which can produce printed documents having selected appearance features and selected ornamental designs. This can reduce the need to utilize preprinted forms and also enables the printing of a greater variety of printed formats. Further the configuration of some embodiments of the machine enable printing only selected portions of transaction information for record keeping purposes within the machine while providing versions including enhanced graphics or other attractive features to customers.

Figure 31 is a schematic representation of the operation of the system in printing forms using a printer in an automated transaction machine. The preferred form of the invention uses the WIN32 printer services which operate under Windows NT® 4.0. In the exemplary transaction shown, the director manager class 180 operating in the terminal theater portion 138 initiates a print receipt transaction by requesting a printer director 182 to print a receipt. The printer director in one preferred embodiment is a collection of instances of related JAVA beans which operate to carry out printing activities, and is one of the directors among the terminal directors 144. The printer director includes a print class which is schematically shown separately which is operative to invoke a print URL method. The printer class in the preferred embodiment includes access to the shared transaction data object which includes the customer specific information concerning the transaction that includes indicia representative of information to be printed. In the case of an automated banking machine this may include for example indicia representative information which is read from a customer's card input to the machine and read by a card reader. This would include for example the customer's name and account number. The other transaction information may include the types of transactions conducted such as a deposit, withdrawal or inquiry as well as the amount involved in each respective transaction.

The transaction services application 146 receives the print request and passes the URL string to the WIN printer object 184 by the print URL method. The URL address in one preferred embodiment is the address of an HTTP record such as an HTML document that will be used to format the document to be printed, in this case a receipt. This HTML document contains the embedded JAVA script that processes transaction data from the transaction data object. The URL address of the document may be on a local machine or may be retrieved from another server

such as through a network schematically indicated 186. Network 186 may be a local area network or a wide area network depending on the configuration of the machine.

The WIN printer object 184 next navigates to the address of the document to be accessed.

This is done in the preferred embodiment using Microsoft's C Web Browser2 ActiveX control.

5 When the HTML document has been loaded the ActiveX control automatically begins processing the content of the accessed document. The transaction services application 146 invokes the print URL method of the WIN printer object 184. The WIN printer object uses the ActiveX control to print the current HTML document. This printing is processed by the Windows NT® print spool and graphics components.

10 The JAVA CDI receives an event from the print monitor component 192 that indicates the completion of print spooling. This indicates that a file is now available to be read and sent to the common device interface (CDI) 188 of the receipt printer.

15 Next a printer object 190 invokes a read data function in the print monitor 192 to determine the location and size of the print data file. The print object 190 sends the data or the path name of the data file to the printer CDI 188. The printer CDI 188 then passes the print data to the printer hardware. This results in printing of the document.

20 Once the receipt is printed the applet from the printer director 182 issues a request to deliver the printed receipt. The delivery request is passed through the transaction services application 146 to the printer object 190. The printer object 190 invokes the deliver method on the printer CDI 188 to cause the receipt to be delivered to the user of the machine. The operation of the software components enables selectively accessing document formats as well as using instructions contained in the documents to include transaction data within the printed documents.

This enables producing documents of varied types. In addition it enables providing printing different types of documents for different customers. This may be desirable when providing marketing information, coupons or similar indicia on transaction receipts. This approach further simplifies providing printed formats in various languages by developing HTML documents which provide printed forms in different languages. In addition the methods of the present invention may be used for providing marketing to customers by profile or types of customer categories, as well as on a segment of one basis.

While the printing method previously described is discussed in connection with delivering transaction receipts, similar methods may be invoked for the printing of statements for customers as well as for printing a transaction journal within the automated banking machine. Further by accessing selected documents controlling the format of printing the information journal records may be provided with consolidated information in a manner which enables conserving journal paper within the machine by not printing promotional or other types of information that is provided on customer documents.

The printing method of the present invention also enables printing various types of optical indicia such as bar code or other types of machine readable indicia which can be used for printing coupons, checks or similar articles. Such coding may facilitate tracking the use of such items by customers for purposes of evaluating the effectiveness of various marketing efforts. In addition machine readable indicia may be used for printing on items such as deposit envelopes and/or in transaction journals. Such printing may facilitate reading such items by machine to verify the contents of deposits.

The printing capabilities achieved through the methods of the present invention also enables the printing of selected graphical materials. This may include for example materials which include imbedded digital signatures which can be used to verify the genuineness of the items printed. This may be particularly useful for example in situations where the transaction machine is used to print scrip, travelers checks, betting slips or other items having independent value. In addition printed documents in full color may be produced by including a color printer in the transaction machine.

Computer software used in operating the automated transaction machines of the present invention and connected computers may be loaded from articles of various types into the respective computers. Such computer software may be included on and loaded from one or more articles such as diskettes or compact disks. Such software may also be included on articles such as hard disk drives, tapes or ready only memory devices. Other articles which include data representative of the instructions for operating computers in the manner described herein are suitable for use in achieving operation of transaction machines and systems in accordance with embodiments of the present invention.

The exemplary embodiments of the automated banking machines and systems described herein have been described with reference to particular software components and features. Other embodiments of the invention may include other or different software components which provide similar functionality.

Thus the new automated banking machine and system of the present invention achieves the above stated objectives, eliminates difficulties encountered in the use of prior devices and systems, solves problems and attains the desirable results described herein.

In the foregoing description certain terms have been used for brevity, clarity and understanding. However no unnecessary limitations are to be implied therefrom because such terms are for descriptive purposes and are intended to be broadly construed. Moreover the descriptions and illustrations herein are by way of examples and the invention is not limited to the details shown and described.

In the following claims any feature described as a means for performing a function shall be construed as encompassing any means capable of performing the recited function and shall not be deemed limited to the particular means shown in the foregoing description or mere equivalents thereof.

Having described the features, discoveries and principles of the invention, the manner in which it is constructed and operated and the advantages and useful results attained; the new and useful structures, devices, elements, arrangements, parts, combinations, systems, equipment, operations, methods, processes and relationships are set forth in the appended claims.